The Chemical Age

VOL LXVIII 18 APRIL 1953 No 1762

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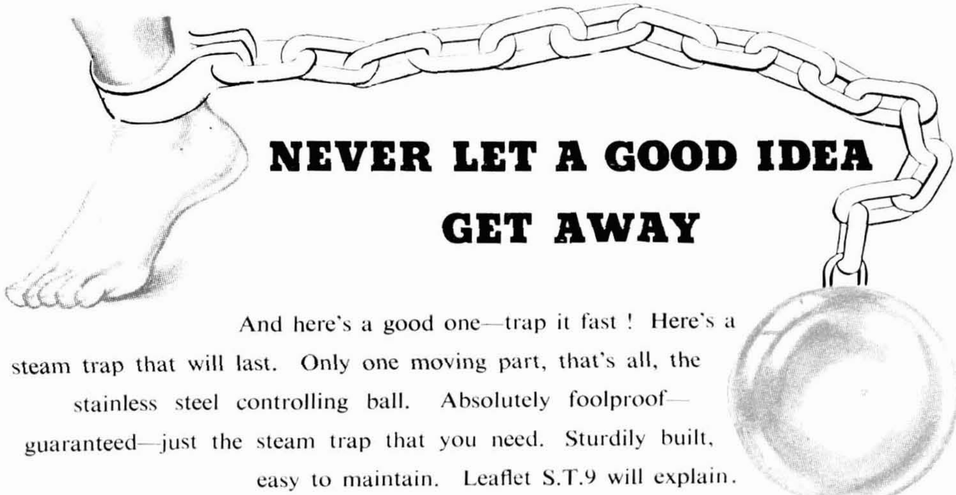

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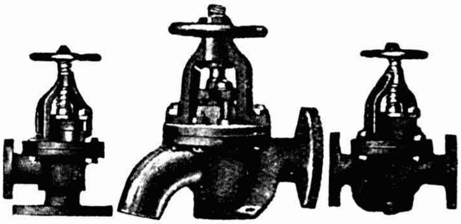

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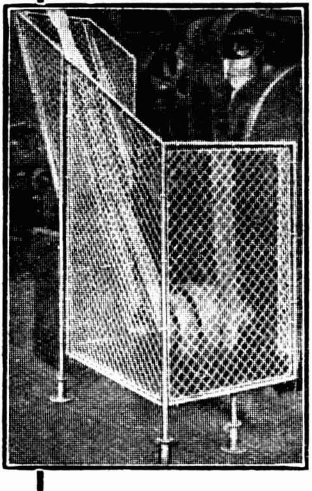

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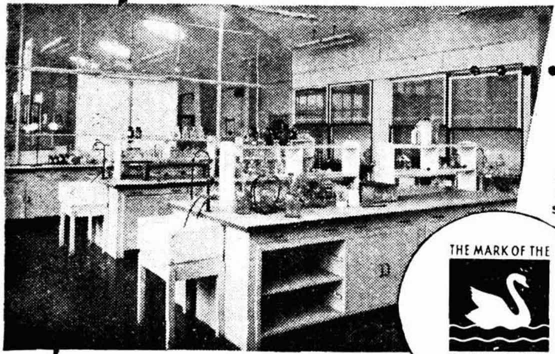

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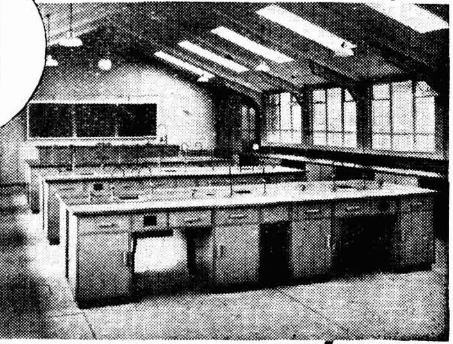

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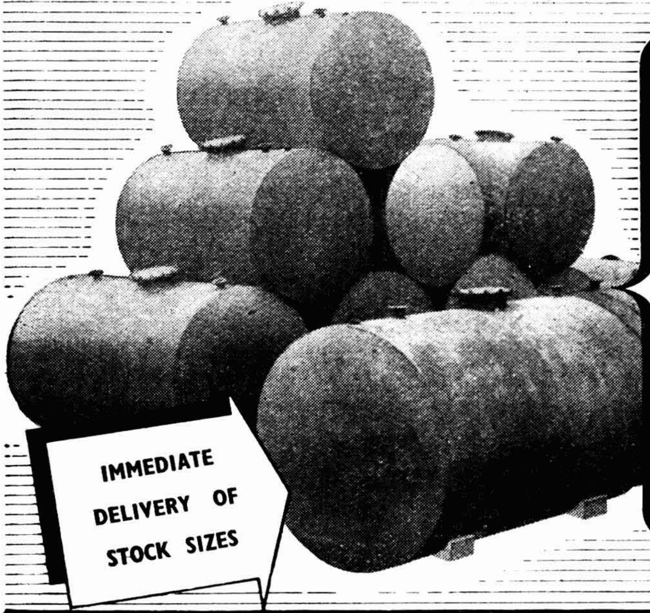

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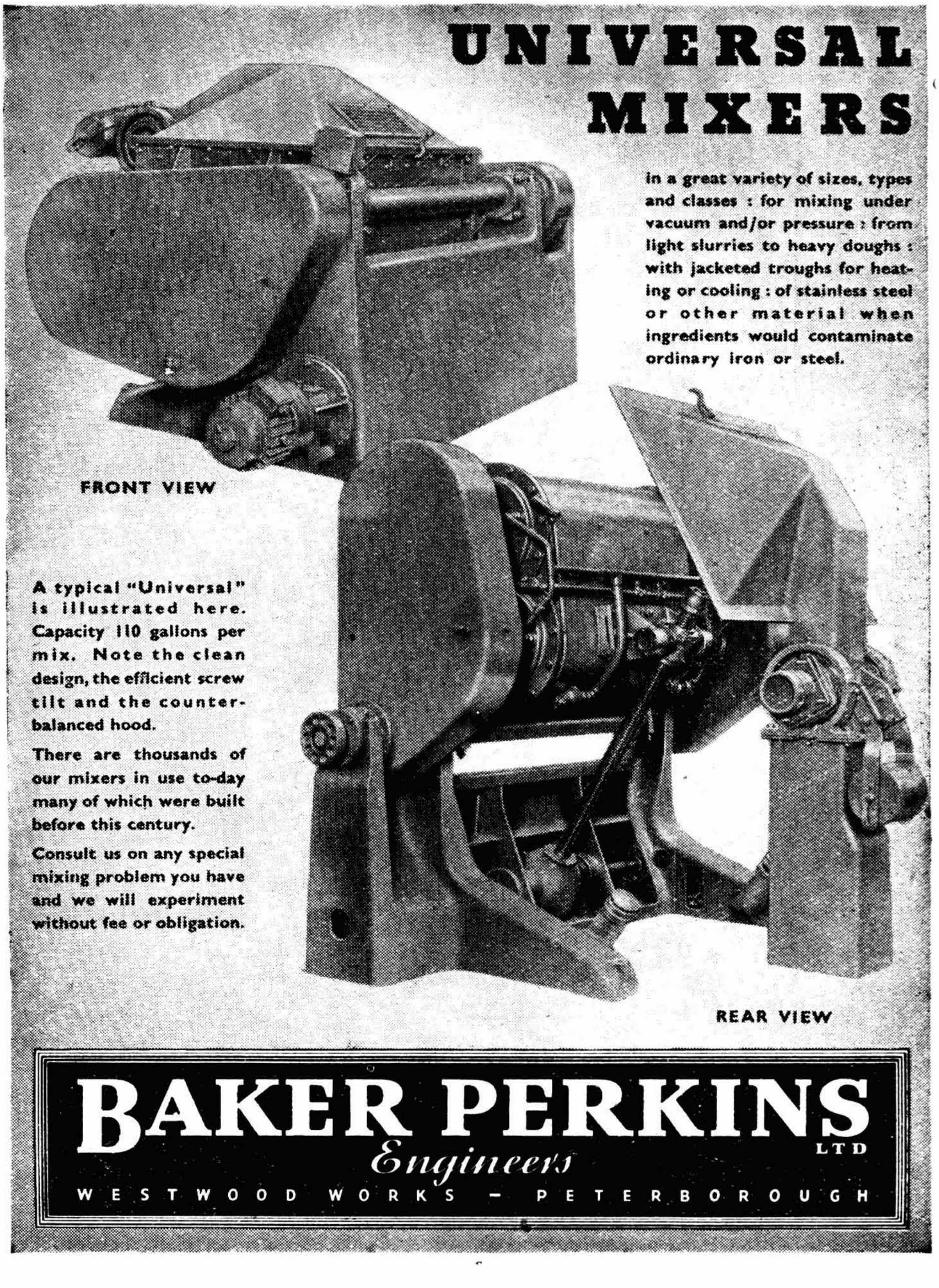

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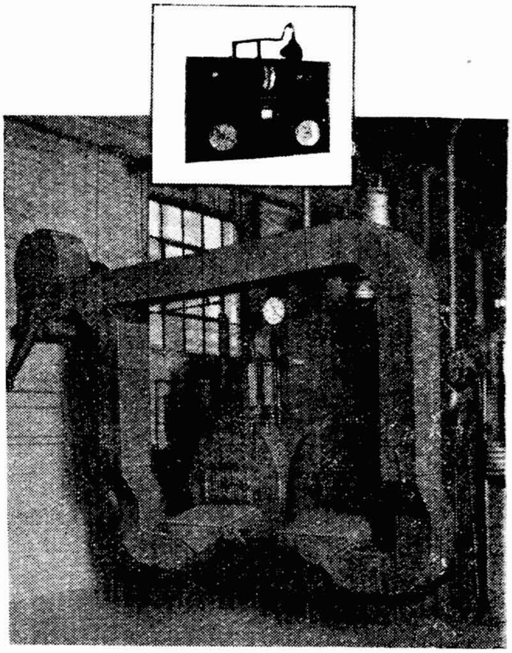

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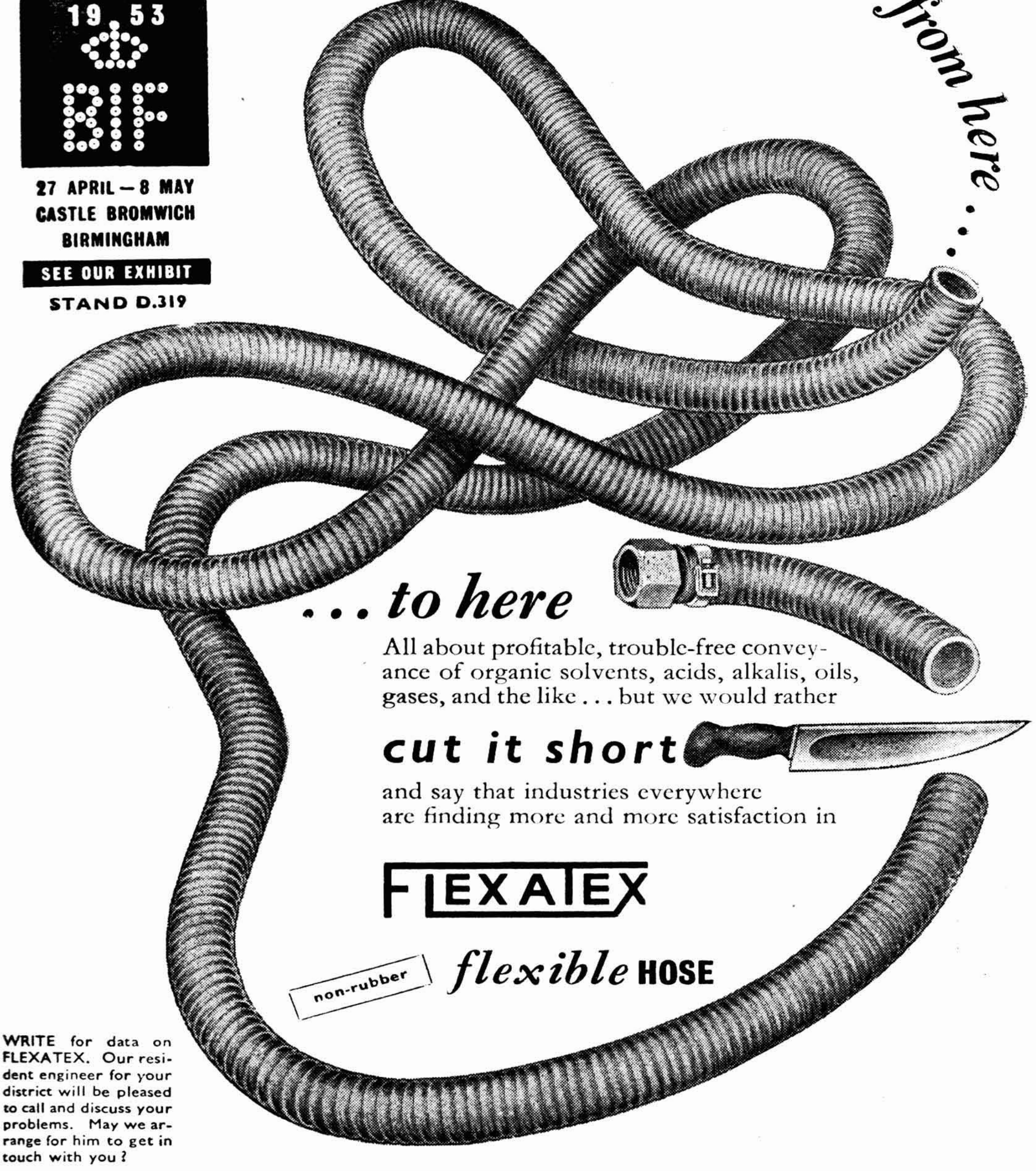

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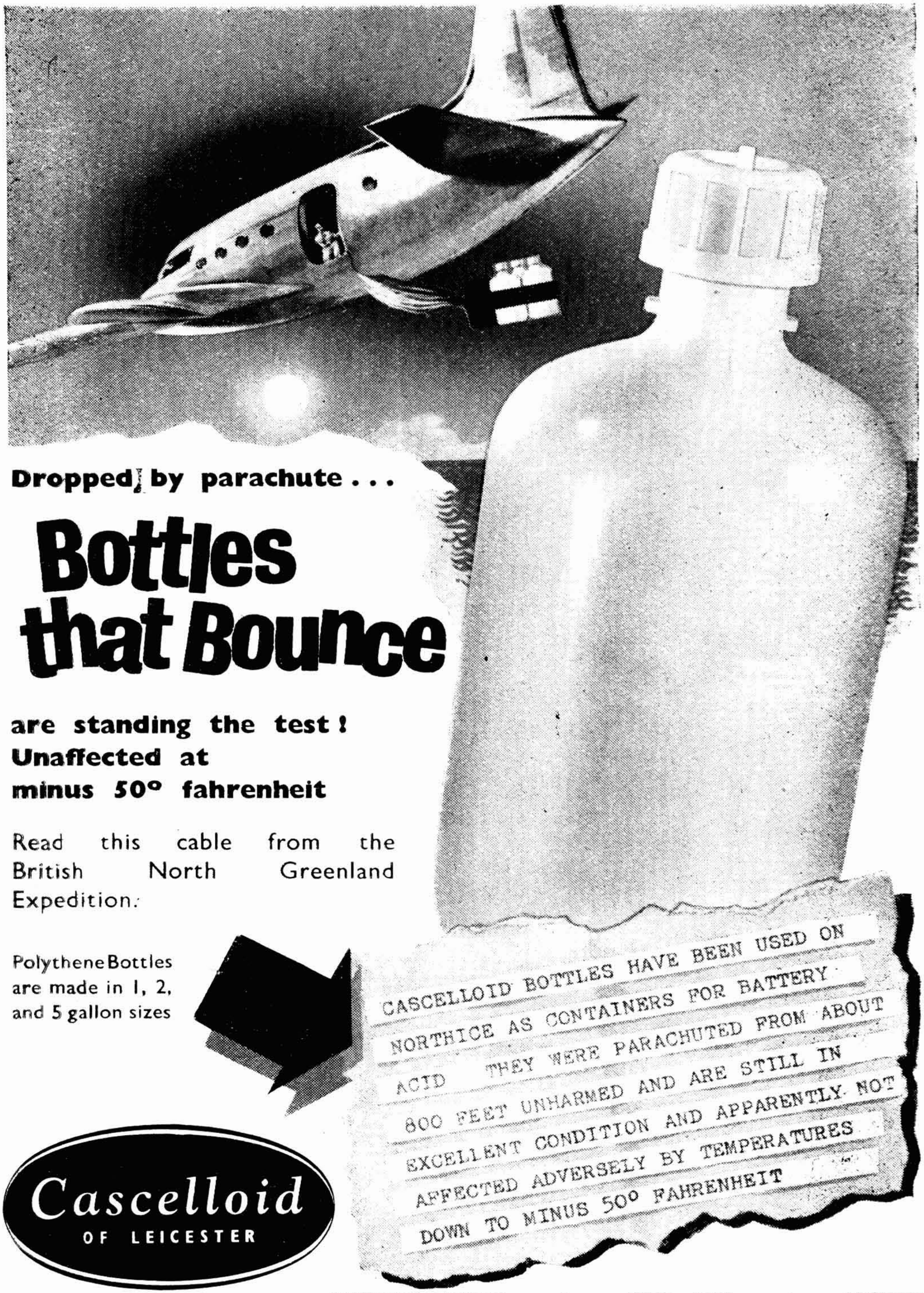

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Volume LXVIII 18 April 1953 Number 1762

Fibrous Facts

THE Commonwealth Economic Committee is not one of those political clearing-house organisations that meets from time to time and issues platitudian communiques at the end of discussions. It is an organisation with a relatively small permanent staff and it regularly publishes trade surveys of the highest quality. A few weeks ago 'Grain Crops' was published, a superbly compiled collection of data about the world's cereals from the wheat of the West to the rice of the East. Last week another survey in the same format, 'Industrial Fibres,' was issued (HMSO, 152 pp., 5s. net). This publication has a more direct chemical appeal than previous surveys in the series. There is no attempt to discuss technical problems in synthetic or semi-synthetic fibre production though the brief and layman-intended descriptions of basic manufacturing processes are commendably accurate and clear; it is the world trade in these materials that is surveyed and no one interested in modern fibres could find this better done.

In an age when the subtle technique of publicity so often covers reality with an alluring haze, many people suppose that factory-reared fibres, cellulose-based or even more truly synthetic, have outdistanced or caught up with the other and older fibres. This is far from the truth. In 1951 world production of cotton, wool, flax, jute and hemp totalled 27,458,000,000 lb. In the same year world production of rayon, protein and other synthetic fibres amounted to 4,224,000,000 lb. Roughly, then, 87 per cent of the world's fibres are still of 'natural' origin. This comparison is not made derogatively. Rather, it shows how much further room there is for the expansion and technological development of the new fibres. In satisfying one of the primary requirements of mankind the filament chemists have as yet only scratched the surface of potentiality. It seems clear that synthetic production (and by safe presumption the demand for synthetic output) is able to rise at a greater rate than natural fibre production. Since 1938, natural fibre production has risen by 19 per cent. In the same period, 1938 to 1951, production of rayon and the synthetics has risen by 120 per cent. The major influence in the rise is the rayon increase—from 1,928,000,000 lb. in 1938 to 3,974,000,000 lb. in 1951. This huge increase dwarfs the entirely new production of 250,000,000 lb. of nylon, 'Ardil,' 'Vicara,' etc. Indeed, on the 1951 figures it is but necessary to take away rayon and the figure left for synthetics represents only 1 per cent of the total world output of fibres.

However, prior to 1950 production of the wholly synthetic or protein fibres (e.g., 'Ardil') was to all intents and purposes an entirely American activity. There since 1949 output has more than doubled itself. In 1951 U.S. production was 200,000,000 lb. and the rest of the world—in fact, the U.K., Canada, France, Germany, Italy, and Japan—together produced 50,000,000 lb. In all countries except Japan nylon accounts for at least half the total synthetic production; in Japan, however, about nine-tenths of the output is of vinyl fibres. Nylon not only predominates in the United States synthetic fibre industry (excluding semi-synthetic rayon) but it seems certain to continue to hold this lead. In 1951 about 65 per cent of output was nylon, and plans for 1953 indicate that nylon will still form 45 per cent of the total production with the rest divided between 'Dacron' (here called 'Terylene'), 'Orlon,' 'Acrilan,' glass fibres, and several others. The Commonwealth Economic Committee's survey points out that nylon production in the U.S. was originally based upon benzene from coal tar, but recently a major swing towards petroleum by-products has taken place. With the rise in refining capacity in Britain and other European countries it is possible that a similar change will occur here.

So far the wholly synthetic fibres have been much dearer than rayon. Here staple nylon fibre costs about five times as much as rayon viscose stable fibre: in America nylon costs 4½ times as much. With few exceptions, the prices of the other wholly synthetic fibres are higher than that of nylon. Rayon's position is based upon a price stability that cannot be achieved by natural fibres, but the new synthetics offer physical properties that often equate with those of natural fibres and in some respects exceed them. The only serious limitation of these modern fibres is the difficulty of dyeing them and even here progress is being satisfactorily made. The future of the wholly synthetic fibres will not be determined by their price relationship with rayon. In many specialised uses they will stand alone, offering specific qualities that natural fibres do not possess. Their consistency of properties and price stability will help them to compete with natural fibres even when natural fibre prices are a good deal lower.

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Notes & Comments

Information Please

IN the recent DSIR Report (see THE CHEMICAL AGE, **68**, 479) a little more than one-sixth of the DSIR Advisory Council's own report was devoted to technical information services. In short, if the right kind of research is being carried out by DSIR establishments, there remains the task of bringing the results to the attention of industry. To the idealist this doubtless sounds like the wrong sequence of cart and horse. If research results of value are available anywhere, it surely is industry's task to chase after them with the energy of salesmen chasing new business? The difficulty, as DSIR workers realistically appreciate, is that most firms badly needing technical help cannot translate research reports or research potentialities into the daily working terms of their own businesses. The link must be forged from the research side. The somewhat grandiose project of a national scientific advisory service for industry has been suggested, but the Advisory Council regards this as impracticable. Industry is too huge, too diverse.

Use Local Organisations

COMPARISON with the National Agricultural Advisory Service at once springs to the mind. Here is a more limited field, large though it is; but a formidable staff of trained men has had to be built up and after some years the NAAS is still in a formative phase, and is certainly in close contact with only a minority of farmers. DSIR preference is for the development of advisory associations with existing and local organisations, e.g., Chambers of Commerce, Regional Boards for Industry, etc. This seems both practical and economical. At least it puts some means of advisory help on the spot and should overcome the feeling in provincial centres that technical help is remote; personal contact and discussion are worth a file of letters. On the other hand, public money is not spent in taking profitable ideas to the very doorsteps of industry. The tax-payer has the right to expect that people in business for profit (even for taxed profit!) should take some of the initiative in securing free technical assistance.

Scientists as Consultants

ONE of the explorations made by the DSIR in trying to build better information services has included a survey of firms' technical resources in two selected areas. It is disturbing to learn that only a third of these firms have arranged for any member of staff to advise on technical matters, and that only half of these advisers in fact possess technical qualifications! Thus, once again evidence is presented for our frequently aired view that scientists should be used far more by small firms as part-time consultants or advisers. It is all too easy to suggest that these firms should each employ at least one qualified man or woman, but this addition to the present annual demand for scientists could never be satisfied. One of the Advisory Council's final sentences, 'We are, however, becoming more and more convinced that science will never be adequately used in this country until many more scientists are employed throughout industry, not omitting the direction and management,' is true enough, but the needs of many of the country's smaller firms could be fully satisfied by part-time scientific advice. The consultant is also in a stronger position than the employee to express and advance his ideas. All too little attention is given to this approach to a major problem.

German Chemical Exports

THE so-called menace which the German chemical industry presents to British competitors is the subject of a letter which Dr. H. Weddigen, of the German Diplomatic Mission in London, recently wrote to the *Financial Times*. He points out that since the

British home market, which in 1937 took 8 per cent of German exports of aniline dyes and 17 per cent of other dyestuffs, is practically closed to German exporters under the Dyestuff Act, German competition must necessarily be felt more acutely in overseas markets. However, overheads in German chemical industries are undoubtedly considerably higher than in this country, due to the fact that most of the firms concerned still have to rebuild their war-destroyed and post-war dismantled plants. The prolonged uncertainty about the future of I.G. Farben has caused much unnecessary delay in rebuilding the industry. All in all, Dr. Weddigen contends that German competition is not such a serious menace that British manufacturers need complain. He may be right but there must be quite a few export managers and salesmen of United Kingdom chemical firms who would find it hard to agree.

Suggestion Box

IN British industry management has rarely welcomed the employees' suggestion box. Ideas, even good ones, should be born at the right levels, and it is an exceptional factory or group of factories where every worker feels he has the right to put up proposals for improving specific operations. At any rate in this respect American industry is more democratic. A good idea is worth testing and development whether it first occurred to the managing director or the stoker. The American Cyanamid Company in 1952 received an average of 103.3 suggestions per 100 employees. At one plant there were nearly 400 suggestions per 100! With more than 20,000 employees, this company received, therefore, over 22,000 suggestions. Cash awards are made to proposers of successful ideas. Last year $1,500, $860, $800, and $600 were the highest awards. If an idea seems potentially useful, it will probably be developed in the research or works laboratories; the original proposer is rewarded not only for the initial idea but for its improvement. It seems clear enough that the suggestion box is kept as busy as a pillar box in this large U.S. company because fair payments are made for adopted suggestions. Out of the 22,155 suggestions of 1952, 5,511 were actually adopted.

Shell IPS Prices Reduced

Attractive price reductions for their two low boiling alcohol solvents IPS1 and IPS2 have been announced by Shell Chemicals as from 1 April.

The new prices for delivery in drums of 25,000 gallons and over are 4s. 9d. and 4s. 2d. respectively. Rebates for delivery in bulk are: minimum 400 gallons, ½d. per gallon below the price in drums; minimum 2,500 gallons, 1d. per gallon below the price in drums.

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The stand of Petrochemicals Limited at the recent OCCA Technical Trade Exhibition held at the Borough Polytechnic, London. A range of petroleum chemicals of particular interest to the paint, varnish and printing ink industries was shown in illuminated flasks, together with panels coated with finishes incorporating the products and photographs showing specific applications

Engineering Group's Annual Dinner

SCI President Outlines Recent Progress

THE annual dinner of the Chemical Engineering Group of the Society of Chemical Industry was held in the Hotel Rubens, Buckingham Palace Road, London, on Friday, 10 April, Mr. H. V. Potter, the chairman of the Group, presiding.

The dinner was arranged for that date in order to coincide with the visit to this country of Mr. Francis J. Curtis, the president of the SCI, vice-president and director of Monsanto Chemicals, Limited, in order that the Group should have the opportunity to honour him as its principal guest.

The toast of the guests was proposed by the chairman. He offered a hearty welcome to Mr. G. Maynard Jenkins, who had travelled from the United States with Mr. Curtis; Mr. Julian M. Leonard, the hon. treasurer of SCI; Mr. E. L. Streatfield, the Society's hon. foreign secretary; Dr. W. Mitchell, Professor H. D. Kay, Mr. W. Leonard Hill, Dr. H. K. Cameron and Dr. W. H. J. Vernon, all of whom took an important part in the work of the Groups of the Society; Mr. Stanley Robson, the president of the Institution of Chemical Engineers, past-president of the SCI and past-chairman of the Chemical Engineering Group; Mr. H. W. Cremer, president of the Royal Institute of Chemistry and past-president of the Institution of Chemical Engineers; Mr. H. V. Yorke, chairman of the British Chemical Plant Manufacturers' Association; Dr. H. J. T. Ellingham, secretary and director of the Royal Institute of Chemistry; and Dr. E. H. T. Hoblyn, director of the British Chemical Plant Manufacturers' Association.

Mr. Potter Pays Tribute

In a tribute to the principal guest, Mr. Potter gave some details of his 35 years of service to the chemical industry. He was a past-president of the American Institute of Chemical Engineers and past-chairman of the American Section of the Society of Chemical Industry. The members of the Group were honoured and happy to welcome him as president of the SCI; he had done the Society great honour by accepting that office, and he had done great honour to the Group in gracing its table on that occasion, in view of his very full programme of activities during his stay in this country.

Mr. Curtis responded to the toast and thanked the group on behalf of all the guests for a very enjoyable evening.

American Chemical Engineers

Speaking of the American Institute of Chemical Engineers, he said it occupied a position somewhat intermediate between the Institution of Chemical Engineers of Great Britain and the Society of Chemical Industry. It had a membership in 1952 of 12,600, divided into four classes: the active members, who must have carried out important chemical engineering work under conditions of responsible charge for a period which varied with their degree of education, numbered about 4,800; associates, who could be almost anyone having an active interest in the profession, numbered 600; juniors, of under 35 years of age, numbered 7,200; and students, 1,100. There were 39 local sections. Four general meetings were held each year, three of which were regional and one national. The problem of the size of meetings was a grave one in the United States; it was particularly true of the American Chemical Society, which would have between 10,000 and 12,000 attending a national meeting. For that reason the American Institute of Chemical Engineers had broken up their spring meetings into three parts held in different sections of the country so that the younger members would have the opportunity to attend. To travel 500 miles to a meeting was not considered extraordinary. The regional meetings had been quite successful, with attendances at about 700.

One of the most important accomplishments of the American Institute was the accrediting system for universities and colleges. He believed that no other single thing had done more to strengthen the teaching of chemical engineering. The Institute had set up specifications as to minimum requirements of staff and courses, and published a list each year of the accredited universities based on careful inspection by sub-committees of the Accrediting Committee. It was a very serious matter for a school of chemical engineering not to be accredited, for many employers were suspicious of graduates from such institutions. Hence, every effort had been made to bring the chemical engineering departments up to the standard set by the Institute. Much of the success of American chemical engineering teaching could be traced to that process.

New Techniques Developed

Coming next to chemical engineering developments, Mr. Curtis referred to new techniques developed by chemical engineers for carrying out processes. They had perfected, he said, several techniques for separating and purifying both raw materials and finished chemicals. Finally, they had taken advantage of a change in the economics of large scale production to construct and operate 'tonnage' ethylene and tonnage oxygen plants.

As an example of a new reaction technique, he mentioned the Daniels process, whereby nitrogen and oxygen from air may be converted directly to nitric oxide by heating air to an extremely high temperature, using the pebble heater, in which a bed of special refractory pebbles was heated with natural gas and air and moved into another zone, usually by gravity. Preheated air was passed over the hot pebbles to raise the temperature to a maximum of 4,000°F. The nitric oxide could be subsequently oxidised and converted to nitric acid. This development gave a thermal method for converting nitrogen in air to fixed nitrogen, ultimately for fertiliser, without passing through ammonia as an intermediate.

In connection with fluidisation, Mr. Curtis recalled Winkler's fluidised reactor for generating gas from coke, and its subsequent modification and extension in the United States to the catalytic cracking of petroleum. Perhaps the great advantage of fluidisation, he said, lay in close temperature control, estimated to be within about 25°F. for reactions involving the removal or addition of heat. In addition it particularly lent itself to catalyst regeneration.

As yet, chemical engineers had not made rapid progress in applying fluidisation to reactions other than petroleum refining. To mention a few processes, however, he said that within the past few years they had applied it to the calcination of limestone, the hydrogenation of carbon monoxide for synthetic fuels, the oxidation of naphthalene to phthalic anhydride, and the catalytic oxidation of ethylene to ethylene oxide.

At least two plants in the U.S. were extracting from natural gas transmission lines a C_2-C_5 hydrocarbon mixture. The C_2 fraction, mostly ethane, was used as a raw material for ethylene. The propane-butane fraction was sold as liquefied petroleum gas. The pentane and heavier fractions were blended as natural gasoline. Although that development was essentially one of engineering economy, it permitted the construction and operation of plants based on ethylene and propylene at locations far removed from their source in the natural gas fields. Provided there was a demand for C_3's and heavier, this operation gave relatively low cost ethane as charge stock for an ethylene plant.

By 1949 the U.S. demand for chemical benzene from coal tar sources far exceeded the supply, and an additional source of benzene was necessary for the continued growth of the production of chemicals from benzene. In the U.S. the petroleum industry came to the rescue, and production figures were:—

	From Coal Tar U.S. Gals.	*From Petroleum U.S. Gals.*
1950	155,000,000	——
1951	175,000,000	28,000,000
1952	190,000,000	45,000,000
1953 (Est.)	200,000,000	——
1955 (Est.)	235,000,000	145,000,000

However, the price of benzene from coal tar had risen from 15 cents per U.S. gallon in 1946 to 30 cents in 1952 and had just gone up another 6 cents. Prices of benzene produced from petroleum had fluctuated rather widely between 40 cents and 60 cents per gallon. It would be his guess that the price would settle around 40 cents to 45 cents.

Catalytic Refining

Petroleum refiners produced aromatics by catalytically reforming a naphtha fraction. This reforming consisted of passing a naphtha fraction over a platinum or molybdenum catalyst at 900°-1,000°F. and under a pressure of 200-1,000 p.s.i. The naphthenic hydrocarbons such as cyclohexane and methyl cyclopentane were thereby isomerised and dehydrogenated to benzene. The gaseous effluent from the reactor was cooled, condensed and subsquently purified.

Large quantities of toluene and xylenes might be produced by catalytically reforming a naphtha or gasoline fraction. Thus petroleum refiners were in a favourable position to produce large quantities of either toluene or xylenes for the chemical industry.

As a potential raw material for chemical manufacturing, the xylenes appeared quite attractive. For example, *o*-xylene was a suitable raw material for oxidation to phthalic anhydride; *p*-xylene was the raw material for terephthalic acid and *m*-xylene was oxidised to isophthalic acid for use in plasticisers.

Because the xylene isomers boiled quite closely together, they were usually separated by super-fractionation to remove *o*-, followed by low temperature (−95° F.) crystallisation to separate *m*- and *p*-. In the U.S. at least two plants were now separating *p*-xylene.

Mr. Curtis went on to discuss the several techniques for separating chemical compounds which had been developed and commercialised during the past decade, and the techniques used for purifying benzene for use in the chemical industry.

In a reference to new separation techniques for purifying butadiene, which was obtained in increasingly large quantities from petroleum sources, he mentioned as one example that ammonia was used to recover butadiene commercially from its mixture with butanes and butylenes. Ammonia formed an azeotrope with butadiene, thus allowing a relatively simple separation, since it might be recovered by stripping and by water absorption. Dow had built and operated the first butadiene plant in the U.S. to use azeotropic recovery of butadiene with ammonia.

Butadiene Recovery

As another example, butadiene might be recovered by adding furfural to operate the separation as an extractive distillation. When furfural was added either to the butane-butylene mixture or to the butylene-butadiene mixture, the relative volatilities were changed in such a way that butylene and butadiene might be recovered. The dehydrogenated mixture might be pre-fractionated and then subjected to extractive distillation so that the butadiene might be separated and purified to specification material.

More recently a separation technique known as extractive crystallisation was finding commercial application. In this technique, urea was added to a mixture in which it formed an 'adduct.' The adduct might be removed by crystallisation, the crystals decomposed, and the urea returned or recycled to the process. Developments were under way to use the method for separating chemical isomers and for refining petroleum mixtures for both lubricating oils and jet fuels.

Cheaper Raw Materials

Several developments, he continued, were the result of producing raw materials in such large quantities that the economics became attractive. One example was the recent plant of Gulf Oil at Port Arthur, Texas, for producing ethylene, the capacity of which was reported to be 2,500,000,000 cu. ft. of ethylene gas per year. No one chemical company would be likely to build such a large plant and thereby achieve low production cost, and consequently, Gulf was transporting ethylene gas by a 100-mile pipeline to five chemical companies in their vicinity.

Another example was the recovery of oxygen from atmospheric air in quantities corresponding to 500 tons per day and larger. Such tonnage oxygen plants were producing oxygen to reform natural gas to carbon monoxide and hydrogen for subsequent Fischer-Tropsch synthesis to liquid fuels and by-product chemicals. Another plant was used to produce oxygen for converting natural gas to acetylene by the Sachse process. Large scale production of acetylene in the U.S. might alter the economics sufficiently to make the entire field of Reppe acetylene chemistry competitive with ethylene chemistry. Still another example was the application of tonnage oxygen to reduce iron oxide in a blast furnace, particularly to reduce the consumption of metallurgical coke.

Concluding, he said that in 1955 the goals of the defence production administration showed a 55 per cent overall increase in chemical capacity. These goals were being achieved by permitting fast amortisation to some degree or another, and many people had wondered whether they would be able to utilise that capacity. It was interesting that when one plotted on semi-log paper the growth of the chemical industry in production from 1915 to 1951, one came to practically a straight line, and the compounding average rate of growth was 9 per cent per year since 1929. If that rate held for four years more, the growth would be 36 per cent, which meant catching up with capacity by 1957, barring a major war. If there were a war, much more capacity would be needed than was available now. Therefore, it did not seem that there was a tremendous risk of excess plant.

One of the most important effects of such expansion was the enhancement of the importance of the chemical engineer. He had gone out of the design groups into research, construction, operation, technical sales, straight sales and top management; indeed, there seemed to be no avenue closed to him.

Therefore, there was a great opportunity and a great responsibility in Great Britain on groups such as the Chemical Engineering Group; he hoped that in the years to come the Group would be credited with a great share in the coming expansion of the British chemical industry.

Mr. Julian M. Leonard (hon. treasurer of the SCI, and a past hon. secretary and chairman of the Chemical Engineering Group) expressed to Mr. Potter, on behalf of the members, their thanks for having presided so ably and for the magnificent work he had done as chairman during the past two years. One of the great efforts that Mr. Potter had initiated was the institution of junior membership, and the Group hoped to attract more of the younger members.

Mr. Potter expressed his appreciation of the kind remarks made and said how much he had enjoyed his office as chairman. He also took the opportunity to express his thanks to Dr. Brennan, Mr. Odams (hon. secretary) and all the members of the Group Committee for the very courteous manner in which they had helped him at all times.

Licenses Offered

Spebra Products Inc., Limited, Los Angeles, California, wish to licence a European firm to produce their chemical preparations (tank coatings, pitch for barrels, etc.) for use in containers in the beverage producing agency.

The Vapor Chemical Company, Detroit. Michigan, offer patents, processes and technique with any necessary equipment to European firms willing to manufacture their electric vaporisers for insect destruction and deodorising.

SCI Summer Tour

Group Members to Visit Belgium

DETAILS have now been circulated of the programme which has been arranged for the summer tour of the Food and Agriculture Groups of the Society of Chemical Industry in Belgium from 23-30 May. The tour will be centred on Brussels.

Members participating will leave Victoria Station, London, at 10 a.m. on Saturday. 23 May, and arrive in Brussels soon after 7 p.m. The following day there will be a whole-day motor-coach excursion to Les Grottes du Han, the Ardennes, Dinant and the Muse Valley, with luncheon *en route*. A tour of Brussels has been planned for the Monday.

Tuesday, 26 May, will be devoted to visits to industrial premises in Louvain, for which the party will be divided into two groups. Places to be visited are the Artois Brewery, Hungaria Mill, Usine Marie-Thomas (vegetable canning factory), Libby's condensed milk factory and Lacsoon's dairy at Rotselaar.

Visit to Research Station

Visits will be paid the following day—Wednesday—to the Centre d'Enseignement et de Recherches pour les Industries Alimentaires, Brussels, in the morning, and the Institut Agronomique de l'Etat, Gembloux, in the afternoon.

On the Thursday the tourists will attend a reception and Vin d'Honneur which is to be given by the Burgomaster of Brussels, Monsieur le Dr. van de Meulenbroek, at the Hotel de Ville, following which they will be divided into two groups for a visit to De Beukelaer, Antwerp (confectionery, biscuit and chocolate factory) and a talk on Belgian milk distribution at the Office National du Lait, Brussels, followed by a visit to the collecting station and the Moderna Dairy, both in Antwerp.

Visits to Maison du Peuple, Brussels (bakery), and a distillery at Ruysbroek, during the morning of Friday, 29 May, will be followed by a reception and meeting arranged by Monsieur Ernest Solvay at the Chateau de La Hulpe, near Brussels. A farewell dinner has been arranged for the evening.

The visitors will leave Brussels at noon the next day and arrive in London about 9 p.m.

Celanese's Chemical Expansion

An Integrated Canadian Industry is Being Built

SALES of the Chemical Division of the Celanese Corporation of America set a new record in 1952. The higher rate of output which was reached in the last half of 1952 is expected to be exceeded in 1953 due to the completion of new production facilities and the increased rate of consumption in the chemical industry at the current high levels of business, according to the corporation's annual report for 1952.

The company's second major chemical plant, located at Pampa, Texas, was brought into operation in the fourth quarter of the year. The Pampa plant produces acetic acid, acetic anhydride, acetone and methanol from petroleum hydrocarbons by a new process developed at the petroleum chemistry research centre at Clarkwood, Texas.

At the Chemcel Plant, at Bishop, Texas, new facilities for the production of paraformaldehyde and trioxane were brought into production in June. Because of their importance to the industrial mobilisation programme both these expansions were granted certificates of necessity.

Construction is proceeding on additional facilities at the Chemcel and Pampa plants for the production of normal butyl alcohol and vinyl acetate, two basic organic chemicals of major industrial importance which will aid in diversifying the company's chemical operations. These were scheduled to begin operations this year.

Laboratory Completed

Completion of the permanent laboratory building at Clarkwood, Texas, in the second half of the year represented an important forward step in the research and development programme for the petrochemical field. Work was intensified on commercially useful derivatives of the basic chemicals already in large-scale production.

Realising the necessity for greater diversification, considerable effort had been put behind the chemical and plastics business to increase the volume and to provide additional products, with satisfactory results.

A new colour-pigmented yarn was introduced during the year and rapid strides are being made in providing producing facilities to increase the available volume. The yarn is marketed under the trade-mark 'Celaperm,' and should open up new fields in fabrics made of combination yarns and reduce dyed fabric costs.

Canadian Chemical & Cellulose Company, Ltd., was organised to consolidate Canadian operations conducted through separate subsidiaries. The three major projects are the dissolving pulp mill of Columbia Cellulose Company, Limited, at Prince Rupert, British Columbia; the petro-chemical and cellulose acetate, fibre and yarn plant of Canadian Chemical Company, Limited under construction at Edmonton, Alberta, and the integrated forest industry being planned by Celgar Development Company, Limited, for the utilisation of the forest resources of the Arrow Lakes region of British Columbia.

Base for Industry

These operations are the base on which is being built an integrated Canadian industry which will utilise cellulose from British Columbia's forests and hydrocarbons from Alberta's oil and gas fields. Common shares totalling 1,000,000, which will represent a 20 per cent interest in the equity of the company when all the subscribed shares have been taken up, were sold to the public in March, one half being marketed in Canada and the other half in the U.S.A.

Initial difficulties that were encountered in bringing the dissolving pulp mill at Prince Rupert into operation, and which resulted in a loss of $1,974,034 (Canadian) for the year, most of which represented depreciation of the plant, have been surmounted and it is now in profitable operation. By the end of the year the plant was operating at its rated capacity. Installation of additional facilities, scheduled for completion toward the end of 1953, will increase the production capacity of the plant from 200 to 300 tons a day.

Good progress was made in the construction of the plant of Canadian Chemical Company, Limited, at Edmonton. While delays were experienced in receipt of certain equipment and materials, it is expected that the plant will commence partial operations by the middle of 1953, and be in full operation by the end of the year.

Expansion of production took place in Mexico and Colombia. In Venezuela construction of the acetate yarn plant of

Celanese Venezolana, S.A., near Valencia, was completed in 1952 and production began in the last quarter. Operation on a limited basis was started in less than 12 months from the time contruction began.

Difficult conditions during the year resulted in a substantially lower volume of business and big decline in the net income. The estimated cost of the completion of plants under construction and commitments for other plant facilities at 31 December, 1952, aggregated approximately $22,000,000.

SCI Farm Tour

Agriculture & Food Groups' Programme

A WIDELY varied programme has been arranged for the farm tour organised by the Agriculture and Food Groups of the Society of Chemical Industry for 5-10 September. Farms in East Anglia will be visited, the tour being centred in Cambridge, where the party will be accommodated, if possible, in one of the colleges.

During the evening of the first day members and their wives and friends will attend a reception in the college by Mr. W. Leonard Hill, chairman of the Agriculture Group, followed by the inaugural dinner. There will be an after-dinner talk on 'The City of Cambridge' or a similar subject.

Motor-coach tours of Cambridge (including the colleges), Ely (to visit the cathedral and monastic buildings) and Wicken Fen (National Trust property) are planned for the following day (6 September).

On the Monday coaches will again be used to take the visitors to the Forestry Commission headquarters at Brandon, where they will tour reafforestation areas and plantations and discuss land reclamation problems. A picnic lunch will precede a visit to F. E. Peele's turkey rearing farm at Thuxton and after tea with Mr. and Mrs. Peele there will be a tour of Lord Iveagh's estate at Elvedon.

The visitors will travel on the Tuesday via St. Ives and Chatteris to Bootsbridge for a tour of the Fenlands with Mr. P. E. Cross (county agricultural officer, Isle of Ely), who will give a talk on 'The History of Fen Drainage' after lunch at March. In the afternoon there will be a conducted tour of St. Germans pumping station (the largest in the world). Fruit growing areas will be visited on the return journey to Cambridge.

A visit to Chivers & Sons orchard factory at Histon, followed by a tour of their pedigree stock farms, will begin the programme for Wednesday, 9 September. Then will come a visit to Pest Control Limited, for a conducted tour of plant and a field demonstration of aerial spraying (if possible), after which there will be a tour of the NAAS provincial centre at Cambridge, with visits to specialist laboratories and field plots.

Tea in the gardens at Anstey Hall will be followed by a summing up of the tour by Mr. G. C. Johnson, provincial director. A farewell dinner will be held in the evening.

Constructional Materials

THE Dechema Deutsche Gesellschaft für Chemisches Apparatewesen has started work on the third edition of the Dechema Tables of Constructional Materials. These tables first appeared in 1937, and have proved a useful aid to everybody whose work brings them into contact with any phase of chemical engineering. A great deal of ground was covered in the second edition, which appeared in 1948, but the new edition will go far beyond this. No fewer than 100 materials of construction of importance to the chemical equipment industry will be dealt with. The behaviour of each in the presence of 850 active chemical agents is indicated on indivdual sheets for each material.

The preparation of the complete third edition is expected to take two years. It will contain the fruits of 20 years' combined work and research by the Dechema and Dr. Erich Rabald, an expert in materials used in the manufacture of chemical equipment. The tables will be issued in the form of a private publication and will not be obtainable through ordinary sources. Since the primary object and aim of the Dechema is planned co-operation between chemists and engineers, the Dechema will be grateful for any material suitable for inclusion in the new edition.

Dunlop Contributions

Dunlop is contributing £50 a year for three years to the Chemical Council to assist in the publication of original research, and 150 guineas to the Trades Marks, Patents and Designs Federation.

De-Salting Brackish Water

Experts to Recommend Method

UNDER the auspices of the OEEC a working party was set up last year to study the de-salting of brackish water. De-salting is a world-wide problem and concerns many countries where water supplies are short or are likely to become so. They include the Netherlands, South Africa, the West Indies and Pakistan.

The working party has appointed a group of experts to study four processes which were considered to merit further investigation They are ion-exchange, separation by freezing, electrolysis and vapour compression distillation. From the information which is supplied by the group, the working party will be able to decide which process or processes call for work on the development scale.

The group of experts is now drawing up its report for presentation to the working party. Waters of 1,000, 5,000 and 20,000 parts per million chloride content have been considered. After the report has been studied the working party should be able to recommend one or more processes for co-operative development to countries of the OEEC, including the United Kingdom. These countries will be free to collaborate or not, as they choose. Those co-operating would, of course, share in the rights of any successful process which may result.

The idea of a working party on de-salting was originally suggested by the Netherlands. In that country the underground water level is falling and the water getting brackish. Although de-salting is not yet a serious problem in Britain there is a tendency for certain London supplies to become slightly brackish. In the next 10 years this may assume more importance.

Those interested in the progress of the work on this subject should apply to DSIR for further information.

Lovibond Comparator Disc

IN conjunction with the British Drug Houses, Limited, The Tintometer, Limited, have been able to add a disc to their range of Lovibond Comparator discs, covering the *p*H values 10.0-14.0 in steps of 0.5. A similar disc for the BDH Lovibond Nessleriser is at present in course of preparation.

There has for many years been a very great demand for permanent colour standards for these high *p*H values, and the British Drug Houses, Limited, had been engaged upon research work for some considerable time before they were successful in producing an indicator for use with these high *p*H values which was stable and reproducible.

This new disc will have a wide application in the following industries:—

1. Users of high pressure boilers for steam generation, such as marine engineers and power stations.

2. Users of water for low pressure steam generating installations and water heating systems.

3. Electro plating works.

4. Mills engaged upon the scouring of cotton.

5. The section of the leather trade engaged upon the lime dehairing of leather.

Rumanian Carbon Black

RUMANIA, for long an exporter of carbon black, is currently offering in Western markets an improved 'furnace' product, according to reports from Bucharest. Specifications suggest that for the first time the Rumanians are now in a position to make a bid for those markets which are at present dependent on U.S. dollar supplies for requirements of best quality carbon black.

Rumanian exporters of the methane gas product are the State concern *Chimimport*. Specifications they are quoting are as follows:—

Specific surface, 34/39 m^2/gram
*p*H, 8.7-8.9
Iodine absorption, 3.8-4.5 per cent
Ash, 0.15-0.6
Humidity, 0.5 per cent
Residue on 16,000 meshes sieve/cm^2 0.1
Colour about 99 grade cabot

Rumanian production is reported to have been increasing as part of a general plan to put the country's methane gas to greater use as a raw material for the chemical industry instead of using it wastefully as a fuel. There are seven dry gas fields in Transylvania and the production target under the present Rumanian five-year plan is an output of 3,900 million cu. metres in 1955.

Scientific Research

'Lack of Interest' by Government

REFERENCE to 'the considerable anxiety' that exists in scientific and industrial circles on the lack of interest shown by the Government in scientific research was made in the House of Commons recently by Mr. A. H. Albu, Member for Edmonton and hon. secretary of the Parliamentary and Scientific Committee.

Mr. Albu asked the Prime Minister if he would appoint a Parliamentary Secretary to the Lord President of the Council's Department so that a junior Minister would be available in the House of Commons with responsibility for scientific research and its application.

Replying on behalf of the Prime Minister, the Lord Privy Seal (Mr. Harry Crookshank) said the answer was in the negative. He pointed out that the Parliamentary Secretary to the Ministry of Works takes questions in the House about the responsibilities of the Lord President for scientific research.

After making the reference quoted above, Mr. Albu asked whether the Government's lack of interest was not reflected by the invidious comparison drawn by the Prime Minister between science and the humanities in his letter to the Trades Union Congress on adult education.

Mr. Ellis Smith referred in further questions to the desire of many people that if any changes should be made a senior Minister should deal with such problems. He also spoke of the disappointment of many people in industry that economies were being made at the expense of scientific research.

Mr. Crookshank replied that the supplementary questions were rather wide of the question on the Order Paper. All he could say about the original question was that the previous Government as well as the present Government had reaffirmed that the responsibility for civilian research should rest with the Lord President.

Fatty Acid Metabolism

THE culmination of years of intensive research has been reached, and the complete pathway of fatty-acid metabolism is known. This news was given by Dr. D. E. Green, of the University of Wisconsin Enzyme Institute, at the annual meeting of the American Chemical Society in Los Angeles on 17 March. A team of eight enzyme chemists have succeeded in isolating all nine of the enzymes involved in successive stages of the breakdown, together with the highly unstable intermediates. As has already been shown in the case of the tricarboxylic acid cycle, the enzyme system is sited on the mitochondria.

Six of the enzymes had not previously been isolated, and the most difficult to obtain proved to be the key to the whole process. This was a deep green flavoprotein, containing a vitamin of the B-complex hitherto unknown. It is hoped that the elucidation of this enzyme system will ultimately result in a better understanding of some of the problems of cancer and diabetes and the work is being pushed forward.

New Roller Coating

THE Edison Swan Electric Co., Ltd., have introduced an entirely new, patented process whereby rollers and other cylindrical parts can be coated with Polytetrafluoroethylene (P.T.F.E.). This process should be of particular interest to food manufacturers and others using continuous feed-through rollers as the properties of P.T.F.E. are such that sticking and contamination are virtually impossible.

P.T.F.E. is a new resin-like substance unique among organic compounds in its chemical inertness and in its toughness over a wide range of temperatures. It withstands the attack of all materials except alkali metals; it can be boiled in alkali hydroxides, hydrofluoric acid, fuming nitric acid or aqua regia with no change in weight or properties. It also resists the attack of all high boiling solvents and other organic compounds.

The material has zero water absorption, high impact strength and form stability, a far greater resistance to chemicals than either gold or platinum and retains its strength at temperatures ranging from −100°C. to +288°C.

Polytetrafluoroethylene is also available in rod, sheet and tape form. It is already being widely used in the chemical and allied industries for gaskets, joints, valve seats, etc. Advice concerning its use, details of stocks and prices may be obtained from The Edison Swan Electric Co., Ltd., Department R.C., 21 Bruton Street, London, W.1.

Norwegian Chemical Industry

Recent Developments Reviewed in New Publication

THE importance of the part played by the Norwegian chemical industry in the nation's economy is stressed by Dr. W. Holst, managing director of the Nerwegian Industries' Development Association, in the course of a most interesting article included in a new and comprehensive publication entitled 'Industries of Norway.'

Altogether there are in the book no fewer than 37 articles from the pens of prominent experts in the various fields, providing ample evidence of the progress and expansion which has taken place in the Norwegian economy since the war. The text is supported by a wealth of photographs, maps and diagrams.

In an introduction to his article Dr. Holst points out that the total value of the production of the chemical industry in 1949, after deduction of purchase and production taxes, was 1,414,000,000 kroner, representing 22.7 per cent of the total production value of Norwegian industry for that year.

A table given by the author shows that the chemical industry, which consists in the main of a large number of small firms, ranks as a good second among the industrial groups of importance from the production point of view.

Since the war, Norwegian industry as a whole has expanded considerably and in particular large investments have been made in the chemical industry, but shortage of labour is proving a handicap. The continued investment of large sums is thought probable in view of the Government's new and comprehensive plans for the industrial development of northern Norway.

Plastics Expanding

It is interesting to note that the Norwegian plastics industry, although of recent date, has undergone a rapid and intense development. In Dr. Holst's opinion it is now fully equal to many of its foreign competitors with respect both to raw materials and machinery.

Of inland raw materials for the plastic industry, special mention is made of urea, which is produced by Norsk Hydro-Elektrisk Kvælstofaktieselskab from ammonia and carbon dioxide. The present capacity of the factory is 10,000 tons a year.

Considerable use appears to be made of fish waste. E. & O. Collett & Company A/S, Oslo, and a Kristiansund concern, Astrup & Company, have co-operated in experiments on the utilisation of protein-containing fish waste for the making of modified protein substances, which in the form of water-soluble albumins are used as a raw material or an auxiliary substance in a number of industries. Raw materials for future use will probably be the waste from fish-processing and filleting factories, or even the fillets themselves, when there is a surplus of this material.

Foam Extinguisher

The main features of this process are extraction treatment for removal of flavour and odour, treatment with alkali, and finally spray-drying to the ultimate product. At Tosse Fiskemelfabrikk a foam extinguisher is made from fish waste according to a process developed by the Military Defence Research Institute.

A new thermo-setting moulding material manufactured from fish waste on a protein basis has been marketed under the name 'Monoplast' by Wm. A. Mohn & Son A/S, Bergen. The powders made by this firm are said to have electrical properties superior to those of ordinary phenol formaldehyde resins, and, moreover, have water-resistance and mechanical strength fully equal to the ordinary moulding powders.

The flow properties of 'Monoplast' make it particularly suitable for transfer moulding. It appears that the flow in the melted powder gives the protein molecules an orientation which increases the mechanical strength.

Also in the field of thermoplastic powders Norwegian industry has obtained a valuable accretion. Heroya Elektrokjemiske Fabrikker A/S (HEFA), a subsidiary of Norsk Hydro-Elektrisk Kvælstofaktieselskab, produces 1,500 tons of polyvinyl chloride a year from acetylene and hydrochloric acid, which the firm obtains from its own chlorine electrolysis plant. The quality of the product has proved to be very good and as there is a large demand it has been decided to increase production to 2,000 tons a year.

It is expected that the production of cellulose acetate will shortly be started by a Norwegian firm on the basis of highly refined cellulose and acetic acid. Thereby a relatively complete basis for a plastics industry should be obtained.

The first machines for the moulding of bakelite articles were taken into service in Norway in 1930. Today about 70 plants are working on products which must be said to belong to the plastics industry. Most of these are engaged in making finished articles out of thermoplastic and thermosetting moulding powders.

Seaweed Uses

As might be expected, seaweed is used extensively as raw material for the alginate industry. The most important types are *Laminaria digitata,* which grows in sublittoral zones (i.e., the urea from the ebb-tide mark downwards) and *Ascophyllum nodusum,* which grows in littoral zones (i.e., the area laid bare at ebb-tide).

As a result of the activities of the Norwegian whaling fleet, large quantities of whale oil are made available for further processing in Norway. In addition, both the sealing operations and herring fisheries provide considerable quantities of oil for use as raw material in the fat industry.

The value of the Norwegian fat and oil industry production was 281.8 million kroner in 1948 and rose by the following year to 313.7 million kroner.

The sea also makes its contribution to the chemical industry in another way. A large plant for the production of magnesium oxide from seawater started in 1951 by Heroya Elektrokjemiske Fabrikker A/S (HEFA), is at present producing dead-burned magnesite. The current capacity of 9,000-10,000 tons of magnesium oxide a year can be increased to 18,000 tons.

Precipitated from Seawater

The process employed is based on the precipitation of the magnesium of the seawater, which for the most part is present as chloride with dolomite. Half the magnesia produced is derived from the seawater and the other half from the burnt dolomite. The magnesium oxide produced at this plant has proved to be very pure and is in demand as a raw material—for example, in the making of refractory materials of high quality.

Part of the magnesium hydroxide which is extracted will later be used as a raw material for the making of metallic magnesium.

In recent years Norwegian industry has received a very valuable addition in the organic chemicals department from sulphite spirit produced by Aktieselskapet Borregaard. This firm now has a total output of 12,000,000 litres of sulphite spirit. In its processing of sulphite spirit the company follows the so-called 'acetaldehyde line.'

An interesting possibility for the transport of acetaldehyde over long distances for subsequent processing to new products is found in the polymerisation of the aldehyde to paraldehyde, a liquid which boils at 124°C. This liquid can be transported with facility in cheap iron barrels, thereby opening up the possibility of conveying acetic aldehyde in large quantities.

Aktieselskapet Borregaard has succeeded in refining its methylalcohol to such a degree that it can be used as a raw material for the making of formaldehyde.

Calcium cyanamide has provided the basis for an interesting organic chemical industry in Norway, Odda Smelteverk A/S having started the making of dicyandiamide with calcium cyanamide as raw material. Dicyandiamide is of importance in the plastics industry as raw material for melamine. The further processing of dicyandiamide to melamine is being carried out at the British Oxygen Company's new plant near Newcastle.

Organo-Therapeutics

Energetic steps have been taken by the Norwegian pharmaceutical industry of recent years to become as independent as possible of imports from abroad. Following research in both the biological and the chemical spheres, there has been great development towards more independent activity in the organo-therapeutical, the biochemical and the synthetic fields.

In the organo-therapeutical sphere the research work carried out in Norway has attracted considerable international interest, especially with respect to the preparation of liver extract for use in cases of pernicious anemia.

'Industries of Norway' is published by Dreyer's Forlag, Oslo, and is obtainable at £5 5s., through Edward Stanford Ltd., 12 Long Acre, London, W.C.2.

Design & Research Centre Report

Future Research Prospects in Doubt

PROBLEMS concerning the future research work of the Design and Research Centre for the Gold, Silver and Jewellery Industries are viewed with concern in its sixth annual report, 1951-52.

This report is of particular significance, affecting as it does the future of the centre, as the termination of the term of office of the existing Jewellery and Silverware Council necessitated the formation of some continuing body.

Under the proposed new constitution the omission of research from the proposals of the British Jewellers' Association reluctantly forced the Governing Council to the conclusion that it might well prove impossible for the Research Section, as at present constituted, to carry on.

It was recommended, however, that a nucleus research staff should be retained, around which the unit could be built up again shou'd circumstances render such a course feasible and desirable.

In September, 1952, the council received with regret the resignation of Dr. G. E. Gardam, the director of research. The report records appreciation of the expert handling of many problems by Dr. Gardam during the past five and a half years and of the lucid reports he has issued.

A number of interesting matters were investigated by the Research Centre during the 12 months under review.

Casting Technique

Large quantities of small fittings for electroplate ware are sand-cast in nickel-silver. It is essential that these have a smooth surface, sharp detail and freedom from surface or sub-surface defects. The casting is mostly done by a few specialist firms, and the first two requirements are well met by the special technique of facing the mould with soot. It is, however, a very general complaint that the castings frequently have surface or sub-surface blow holes.

Methods of two foundries were inspected and a large number of trials carried out by the centre's staff in one of them. It has been concluded that the blow holes are entrapped; air and sand carried down by the molten metal as they are equally prevalent in castings of other non-ferrous alloys. The quality of the castings can be substantially improved by control of the moisture and permeability of the sand, but especially by redesign of the gating system so that the runner is kept full at all times. Even so, it is difficult to ensure perfect castings by this method and the advantages of investment castings have been pointed out in spite of their higher cost.

Electrolytic Manganese Cheaper

In the course of this work it was found that replacement of the nickel in the nickel-silver by electrolytic manganese resulted in a considerable saving of cost, while introducing no difficulties in soldering or plating.

The centre has firmly established itself as a central consulting authority on the investment casting method of jewellery production and has a complete set of equipment for demonstration and experimental purposes. As it was impossible to purchase an effective device in the U.K. for injecting wax into the rubber moulds, the centre designed and patented a simple apparatus, and arranged for its manufacture and sale to the trade. Of these injectors, 13 have been sold.

A recommended method of making the rubber moulds in which the wax patterns are cast has been fully described and illustrated in a research report.

A large number of different investment plasters have been practically tested and simple procedures and equipment devised to obviate or minimise the inclusion of air bubbles in the investment, as these cause defects on the casting. Many demonstrations of the process have been given.

In previous work it had been shown that a brilliant metallic lustre could be obtained on costume jewellery without laborious polishing by the process of lacquering to produce a smooth surface and then metallising this surface, preferably with aluminium, by vacuum evaporation. Considerable attention has now been given to the types of lacquer and methods of application which produce the maximum smoothing effect and a simple quantitative test has been devised for this property and published.

Removal of volatile components is necessary before vacuum treatment and this necessitates careful choice of lacquers and stoving processes especially when a plastic article is being decorated. Some experiments have been made on evaporation of yellow-coloured alloys to stimulate gold, but without great success, owing to the fractional distillation of alloys. Further attention has therefore been given to the established method of absorption dyeing of a lacquer film applied over an evaporated aluminium coating which provides a method of obtaining a finish of uniform colour and metallic appearance.

Protective Coatings

In the gilding of base-metal watch bracelets, watch-cases, jewellery and so on, a coating of closely-defined colour and high lustre is required which has considerable corrosion and abrasion resistance.

As the volume of solution is kept to a minimum for economic reasons and rapidly deteriorates, accurate control is difficult.

Experiments were in hand directed to producing a bright, acid-test resistant coating, and, in view of the lack of satisfactory advance by changes in chemical composition, attention was being chiefly directed to the electrical conditions, notably by use of pulsating current.

It was found possible to produce bright desposits of any thickness in this way from a solution at room temperature, and in addition to arrange the composition of solution and electrical current so that any coloured gold deposit from red to green could be obtained by adjusting a knob. This process appears to be of general applicability to the electrodeposition of alloys.

The director of research spent three weeks in the U.S.A., of which one week was devoted to a conference on research in electrodeposition at the National Bureau of Standards, Washington, and the remaining two weeks to visits to electroplate and jewellery manufacturers in New England. The major portion of the expenditure was generously defrayed by the U.S. Bureau of Standards. The wide and effective use of certain types of polishing machines in the production of flatware was confirmed, but no novel methods of jewellery production were seen.

Colour and reflectivity of jewellery and silverware metals is obviously of great importance from a sales and design point of view, but its appreciation tends to be confused by the reflection of surrounding coloured objects. Preliminary studies of this subject have been made with a spectrophotometer which measures the ratio of the reflectivity of a standard, such as E.P.N.S., and the specimen under test for each of nine different coloured lights, obtained by passing light from a tungsten lamp through appropriate filters. Nine points are thus obtained on a spectral reflectivity curve for the specimen.

This is less satisfactory than a prism and slit spectrophotometer, but is probably reliable for the smooth spectral curves given by metals. From these curves the trichromatic coefficients and luminances (or average reflectivity) can be calculated and plotted on a colour triangle. Results have been obtained for a number of near-white metals and electroplated coatings, also for copper, brass and a series of gold alloys.

It is believed that this work, while not immediately applicable to industry, can yield useful information on the simulation of precious metals by less expensive ones.

Making the Best of Research

ONE of the most perplexing problems facing chemical producers today is the practical exploitation of the research they are carrying out in many fields, Frederic A. Soderberg, vice-president, F. C. Huyck and Sons, Rensselær Falls, N.Y., told a recent meeting of the Montreal branch, Chemical Institute of Canada. More than 300 potential chemical products are still on the shelves of research laboratories, he added.

Addressing the gathering on 'Scientific Approach to Commercial Chemical Development,' Mr. Soderberg maintained that the hall mark of good management is the expedient use of all available manpower.

Many chemicals drop into oblivion in the critical area between sales and research due to lack of co-ordinated effort, he continued. Outlining the scientific approach designed to bridge this gap successfully, he said that among its more important elements were market research, advertising, technical service, application and use of research, field work pricing, and instruction to field and sales organisations. He also dealt with problems that must be met at the beginning of full-scale production.

The Fractionation of Liquid Air

A New Method of Design Calculation

FRACTIONATION of liquid air is of considerable practical importance, since most of the constituents of the atmosphere are of commercial value when isolated in a more or less pure form, and is also of great theoretical interest as a chemical engineering problem. In a paper entitled 'The Fractionation of Liquid Air: A Study of Design Methods for 3-Component Mixtures,' read before the Institution of Chemical Engineers at Burlington House, London, on 14 April, L. E. A. Clare, M.Sc., G. G. Haselden, Ph.D., A.M.I.Chem.E., and R. A. Nottle, B.Sc. (Chemical Engineering Department, Imperial College), put forward a new method of design calculation for rectifying columns.

Although argon constitutes only about 1 per cent of dry atmospheric air it interferes with the separation of oxygen and nitrogen by distillation because its boiling point lies between those of the two major constituents. In addition, the molal latent heats of oxygen and nitrogen differ too greatly to permit the use of constant molal overflow, particularly when minimum reflux conditions are applied. Many of the simplifying assumptions normally applied to this type of problem are therefore not permissible. The approximate solutions which would arise from their use are inadequate, since the low temperature and the large scale of operation necessitate very high yield at low reflux ratios for economic efficiency.

Recent increases in the demand for argon and for oxygen in very large quantities have brought with them problems of column design for which there was no previous experience, and which demand very exact solutions.

Excessive reflux increases the power consumption and possibly the capital cost, while the use of too many plates increases the column height, cold losses and capital cost.

Enthalpy Model

In calculations for the fractionation of binary mixtures the Ponchon-Savarit method of plotting the molal enthalpy of the vapour and liquid against the vapour and liquid composition, respectively, is unique in giving both a rigorous solution and at the same time a graphical representation of the separation process and of all the heat quantities involved. The new method proposed by the authors is the application of the Ponchon-Savarit calculation to ternary mixtures, requiring a three-co-ordinate solid model instead of the two-co-ordinate *H-x* chart. The composition co-ordinates are set at an angle of 60° to one another so that the pure components are located along the three parallel edges of an equilateral prism, the remaining co-ordinate (enthalpy) defining the depth of the prism. At any constant pressure between the critical and triple point pressures of the components two surfaces will be present in the diagram, being the loci of the equilibrium liquid and vapour mixtures respectively. In general these surfaces will have a slight curvature away from each other.

Using the Diagram

Every point within the diagram will represent a mixture of fixed composition, enthalpy and states. It is also possible to assign a mass to a point in the model, so that the product obtained by blending together two mixtures, represented by two points on the model, is obtained by drawing a straight line between the points and marking off their resultant at the centre of gravity of the two masses. The effect of adding or removing heat from a given mixture is found by proceeding from the appropriate point in the model along a line parallel to the enthalpy axis.

A much simplified solution is available if the surfaces are assumed flat but not parallel. Published *H-x* diagrams for the oxygen-nitrogen system at pressures near atmospheric show that for the binary mixture this is very nearly the case. The further simplification of making the planes parallel renders the method identical with that of Lewis and Matheson, who modified the classical Sorel approach by the assumption of equal molal latent heats.

The authors have successfully applied their method to the solution of two problems of industrial importance: the determination of minimum reflux in an air separation column of the Elliott or Rescol type for the production of tonnage oxygen at 95 per cent purity; and the solution of a Linde double column with additional gaseous air feed.

At the present time the thermal data for the oxygen-nitrogen-argon system are insufficient to justify the construction of an enthalpy model. An apparatus for the fractionation of air over a range of operating conditions has been erected by R. W. Sargent, K. W. Glover and the authors, and when data become available it is considered that a model could be built, using, for instance, moulded perspex surfaces and light sources at the operating points, on which direct plate-to-plate constructions could be made. Alternatively, it might be possible to fit approximate equations to the surfaces and to solve the steps algebraically.

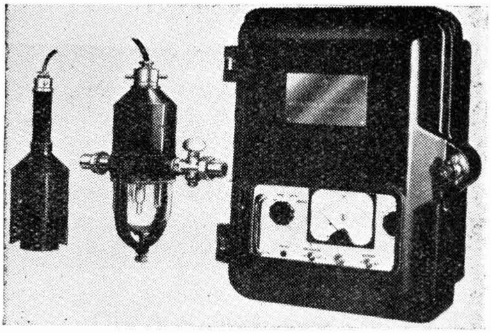
Industrial pH Control

Significant Developments in Electrodes

A VERSATILE industrial *p*H meter which is now in full production is the model 28 made by Electronic Instruments Ltd., of Richmond, Surrey. Developed specifically for factory use, the instrument and electrode systems are the outcome of many years of practical application in the measurements and control of *p*H in industry

The following technical report of the latest version of the instrument has been issued by the company.

Model 28 may be used by itself or it may be linked with standard recorders and controllers of the type used in modern factories for the measurements of temperature, pressure and liquid level. This arrangement enables the plant engineer to set up a complete *p*H control installation with the minimum of trouble and often with equipment already to hand.



Model 28 pH meter and electrodes

Electrically, this *p*H meter sets a high standard of performance, as it will run for several days with a stability of ± 0.02 *p*H without routine attention. An important feature is the provision of complete temperature compensation which enables the electrodes to be standardised at one temperature and to operate precisely at all other temperatures without readjustment of the controls.

The instrument—which is designed for wall or panel mounting—is hermetically sealed and may therefore be installed in the open or in an atmosphere containing noxious fumes or vapours. Provision is made for pressurising, and a flameproof case can be supplied for use under exceptionally hazardous conditions.

The continuous flow and dip type electrode systems which accompany Model 28 are scientifically engineered to ensure that replacement of electrodes can be carried out with the minimum of trouble and with the assurance that the high insulation required in the electrode head will not be impaired in the process.

Significant Developments

Two significant developments in electrodes have been made. The first is the production of a high temperature electrode consisting of a highly complex glass as the *p*H responsive membrane, together with a unique arrangement for stabilising the internal elements of the electrode. These electrodes may be used over the whole *p*H range, and as the glass contains no sodium, continuous operation at 100°C. and in strongly alkaline solutions is possible.

The second improvement is the provision of a sealed reference electrode which does not require regular replenishment of the potassium chloride solution. This electrode was designed after thorough study of the origin of spurious potentials which often arise in the measurement of liquids of low electrolyte content and such errors are now satisfactorily eliminated.

This sealed reference electrode may be used under vacuum, or at pressures up to 50 p.s.i., at room temperatures, or at 100°C. Under favourable circumstances, one year's service may be expected, after which the electrode can be returned for replenishment.

Vaporising Liquids as Fire Extinguishers

Results of Tests at the Fire Research Station

THE use of vaporising liquids (such as carbon tetrachloride) for extinguishing fires involving inflammable liquids (such as petrol) is well established; these extinguishers behave as inhibitors of the combustion of the vapours.

Some of them are unfortunately toxic compounds, or give rise to toxic decomposition products when used on a fire. This restricts the use of such materials to special risks, where their high efficiency outweighs the toxic hazard, or to situations where the operator is not exposed to the vapour.

Limitations thus imposed on the use of this type of extinguisher have led to searches for compounds which are less toxic or, because of a more powerful extinguishing effect, would require so little extinguisher as to make the total atmosphere less toxic. Two suggested alternatives have been methyl iodine and chlorobromomethane, the latter being developed in Germany during the war.

Results of systematic tests on these compounds carried out at the Fire Research Station, Boreham Wood, Elstree, Herts., as part of the programme of the Joint Fire Research Organisation of the Department of Scientific and Industrial Research and the Fire Officers' Committee have been published in a paper by E. H. Coleman, F.R.I.C., as Technical Booklet No. 11 of the Fire Protection Association.

Tests with Hexane

Work described in the paper entitled 'A Comparison of the Extinguishing Effects of Chlorobromomethane, Methyl Iodide and Carbon Tetrachloride,' was carried out by determining the effects of these compounds on the inflammability limits of a pure combustible, namely normal hexane. This was selected because it is a readily obtained pure compound with combustion properties comparable with petrol, and also because its inflammability limits with methyl bromide and difluorodichloromethane (Freon 12) have been studied in detail.

The tests were made in a vertical glass tube 6.5 cm. diameter and 160 cm. long. Mixtures of air, combustible, and inhibitor, were introduced at the top of the tube and led away through the bottom and the mixture was passed through the tube for sufficient time to ensure that the tube was completely filled with the mixure under test. A small gas flame was applied to the bottom of the tube.

If the mixture was too weak, that is below the lower inflammable limit, there was no flame. As the proportion of combustible was increased the mixture was ignited but the flame only rose a small distance up the tube; this distance increased rapidly with increasing concentrations of hexane and the mixture was considered inflammable if the flame rose through the whole length.

When the mixtures passed the upper limit they were too rich to burn inside the tube but burnt at the mouth. The lower limits were more clearly defined than the upper limits.

Results of Experiments

Results of the tests when plotted showed that the lower limit limbs of the curves were approximately coincident whichever inhibitor was used, while the limiting safe ratios of inhibitor/hexane were all approximately the same.

In the upper limit region the effects of the inhibitors were different, and were greater on the upper than on the lower limit. The differences between the inhibitors were shown by the differences between the peak values or the inhibitor/air ratios for the various compounds tested.

From the results it appeared that the effectiveness of these inhibitors increased in the order Freon 12, carbon tetrachloride, methyl bromide, chlorobromomethane, methyl iodide.

Concentration of inhibitor required for extinction varied with the combustible, but the relative efficiencies of the various inhibitors were in the same order.

The efficiencies tabulated were compared on a volume basis. If, however, the comparison were made on a weight basis the limiting safe mixtures of inhibitor and air were approxmately the same for methyl bromide, chlorobromomethane and methyl iodine, but carbon tetrachloride and Freon 12 were much less efficient.

In the discussion of the relative efficiencies of the inhibitors other practical factors relating to suitability had not been considered. The suitability of a vaporising liquid extinguisher required consideration of properties other than its effect on inflammability limits or flame extinction. In such experiments the liquid was vaporised completely and its volatility did not affect the result.

Volatility & Toxicity

Practically, volatility was important since it affected the ease of projection on to a fire, the ease of conversion into active vapour, and also to some extent the portability. Inhibitors with very low boiling points and correspondingly high vapour pressures required stronger, heavier containers, and were more difficult to project on to the fire without dispersion than were liquids of higher boiling point. If the boiling point was too high there might be a risk of incomplete volatilisation.

Toxicity of the extinguisher was an important consideration. It had been shown that chlorobromomethane was of the same order of toxicity as carbon tetrachloride, and an investigation by the Medical Research Council showed methyl iodide to be at least as toxic as methyl bromide and 10 times as toxic as carbon tetrachloride.

More Plastic Cars

ABOUT 1,200 car bodies made of reinforced plastic are stated to have been turned out in the United States of America since 1945 and it is estimated that 10,000 such bodies or more will be built next year. Although these are not large numbers compared with the total of cars produced in that country every year, both the car industry and the plastics industry are said to be enthusiastic about future prospects for the use of plastics in car manufacture. Although the plastic first used was strong, it was brittle and unable to withstand extreme changes in temperature. Research since then has improved the material and the so-called 'reinforced plastics' used now combine plastics and a strengthening agent. Basic components are any of six resins—polyester, polystyrene, phenolic, melamine, silicone or epoxy—and a reinforcing material such as paper, cotton or fibrous glass.

Chlorophyll

More Differing Opinions

OPINION is as sharply decided as ever in the chlorophyll controversy. (See CHEMICAL AGE **68**, 123, 415, 443.) Two letters for and two against appear in the *British Medical Journal* of 11 April. In reply to the letter from Dr. W. Mitchell (Chief Chemist, Allen Chlorophyll Co., Ltd), published in the *BMJ* on 14 March, Dr. S. Alstead reports his application of the, by now, notorious 'asparagus test,' preceded by no less than 140 proprietary tablets, which apparently gave no de-odorising effect whatsoever; on a subsequent occasion he swallowed 100 tablets, and after seven hours took another dose of 100 tablets, followed immediately by a serving of asparagus. Again he had no success. Dr. Alstead is unimpressed by the deodorant effect of sodium copper chlorophyllin in a garlic oil still, and also suggests that Dr. Mitchell should carry out tests with methyl mercaptan instead of benzyl mercaptan.

A short letter from Dr. Corwin, of John Hopkins University, Baltimore, who first put the cat among the pigeons, expresses appreciation of Dr. Brocklehurst's work, and suggests that, since most of the commercial materials now on the market contain 50-75 per cent alfalfa extractives other than the green pigments derived from chlorophyll, it is incumbent upon manufacturers to prove that any deodorant properties are not in fact due to a masking of the undesired odour.

On the other hand, Dr. Holzer of Birmingham reports favourably on the use of chlorophyll-soaked dressings for foul-smelling wounds, and Messrs. D. Maxwell Bryce and R. Maxwell Savage draw attention to a paper of theirs (*Pharm. J.* **170**, 209) which gives statistical proof of the reduction of odour of decomposing blood by chlorophyll-soaked pads.

The facts about chlorophyll were put dispassionately before the general public by Dr. Magnus Pike in the B.B.C.'s 'Science Survey,' on Thursday 9 April. Without committing himself to an expression of personal opinion, but critically surveying all the published literature, he succeeded in damning almost all the claims made for chlorophyll, allowing it merely a mild bacteriostatic action.

Russian Research on Aluminium Alloys

Oxide Films Examined Under the Electron-microscope

IN some recent Russian work on the effect of plastic deformation on the subsequent breakdown (dissociation, Russian *raspad*) of aluminium alloys, reported by N. N. Buinov and L. I. Podrezov (*Doklad, Akad. Nauk SSSR*, 1953, **88** (4), 665-668), it is pointed out that, in their previous experiments,[1] the authors had used the oxide film method with the electron-microscope to examine the effect of plastic deformation in the alloys Al-Si and Al-Mg-Si; more particularly in the surface layer where oxide films had been produced on a surface prepared by electro-polishing and etching to the point of deformation and possible work-hardening.

Grains of Breakdown

By this means it was possible to observe simultaneously grains of breakdown (crystallites) or precipitation, the mosaic structure of the alloys, and planes of slip. It was not possible in this case to apply such surface results to the whole mass, for the following reasons.

In the electron-microscope examination of aged alloys of Al-Ag[2] it was found that dissociation in the surface layer differed from that in the interior. From experimental data of other authors it was known that phase transformations in the surface layer may substantially differ, at least in rate of occurrence from those in the mass. For example, in the transformation of white tin into grey, in A. P. Komar's work[3-4] it was shown that the rate of change at the surface was markedly higher than in the interior. In the study of carbide alloys (hard metals) Ya. S. Umanskii also noted that breakdown in a tantalum-tungsten carbide, during annealing or tempering, proceeds more quickly at the surface.[5]

It may be that such changes not only differ in speed but also in their essential nature, although this may be due to possible enrichment or impoverishment of the surface layers with impurities on the basis of the Gibbs effect. It was therefore decided to undertake further experiments on the effect of plastic deformation on mass or volume dissociation of alloys Al-Si (1.2 per cent Si by weight), Al-Mg-Si (1.4 per cent Mg_2Si), Al-Cu (4 per cent Cu) and Ak 5.

The test pieces were etched after deformation and heat treatment, the former being effected as in the earlier work.[1] Tests were also made with deformations up to 60 per cent caused by pressing between hand rollers. The complete cycle of operations was therefore: hardening (quenching), deformation, ageing, repeated electro-polishing, and etching and final examination under the electron-microscope of the oxide films formed. Repeated electro-polishing and etching removed surface layers and eliminated surface effect. The deformed and non-deformed test pieces were then aged: the Al-Si and Al-Mg-Si at 160, 210 and 260°; Al-Cu at 100, 150, 187, 210 and 260°; and the Ak 5 at 150°. Ageing time was such that maximum hardness or near maximum hardness was attained.

It was again found that breakdown of the surface layers differed from that of the mass. The difference partly at least consisted in a more disperse form, with particles having a more normal configuration, that is crystalline, while the surface layer exhibited neither of these features. But distribution of the separated particles did not differ appreciably in the two cases (surface and mass). Nor was there any marked preferential breakdown in the direction of possible planes of slip, as shown in micro-photographs in the original.

Distribution of Stresses

So far the results, taken in conjunction with those previously recorded,[1] seem to indicate that residual stresses in these alloys do not appear to be specially localised in planes of slip, but are fairly generally distributed. It is possible too that deformation also is more or less uniformly distributed; though this has not been definitely determined with the technique used in the present and earlier work.

In this connection reference is made to the electron-microscope examination of the surface of plastically deformed mono- and polycrystals of high purity aluminium, undertaken by H. Wilsdorf *et al.*[7] These authors, using the method of quartz films tinted with tungsten oxide, found that the whole surface of the aluminium specimens, 15 per cent deformed, was continuously covered with fine (thin) slip markings, corresponding to a possible system of planes of slip. This would indicate a relatively uniform distribution of deformation in the aluminium crystal.

By the oxide film method such slip markings have usually been observed only in isolated groups; and as a rule clearly seen only in one direction. Possibly this is connected in some way with the relatively low definition of this method in regard to slip phenomena. A plausible reason for this may be found in the fact that the oxide film is formed not only from the test piece itself but also partly from the accumulated oxide layer on its surface.

Active Centres

Since, in the tested samples, there is no marked increased in dimensions of separated particles of the deformed as compared with the non-deformed specimens, the accelerating effect of breakdown by plastic deformation must be ascribed to the creation of a larger number of active centres and not to a reduced coefficient of diffusion. This suggestion agrees with the parallelism of the lines 1/T and 1/nt for normal and for 40 per cent deformed Al-Cu alloys, and with the parallelism of the lines (curves) for degree of deformation (1/nt) for different temperatures of ageing, as found by Marie L. V. Gayler[8] in the case of Al-Cu alloy.

With these curves T is the temperature of ageing and *t* the times required to reach the second maximum hardness. The parallelism of these curves obviously indicates also that the plastic deformation (from 40 to 90 per cent) used by the latter author[8] accelerates breakdown in the Al-Cu Alloys (4 per cent Cu) without showing any appreciable effect on the coefficient of diffusion. This can be fairly easily understood if it is taken into account that residual stresses are distributed in crystals with relative uniformity, that is, without large gradients. In all parts of the alloy the energy of residual stresses is much lower than the heat of diffusion. In the literature it is stated that the amount of the first does not exceed 100-200 cal/g-atom, but the second may be tens of thousands of cal.[9] Therefore the effect of plastic deformation on the coefficient of diffusion with relatively uniform distribution of residual stresses should be practically negligible.

Because of the interest and importance of the Al-Cu alloys it may be well to recall some of the results of Miss Gayler's work at the NPL in 1946. It was mainly concerned with cold working and its relation to age-hardening, studied by means of microscopical analyses and hardness measurements. Among other things it was shown that cold working accelerates ageing rate in proportion to its amount; the effect of cold working on quenched specimens is to reach the fully aged state normally produced at room temperature, and the effect of further ageing at room or higher temperature was related to conditions determined by the normal time-hardness curves. Important results were also obtained in regard to lattice strain, formation of crystallites with precipitation of copper-rich particles, and mechanism of strain relief. Lattice strain resulting from cold rolling of a soft annealed specimen may be associated with Brinell hardness.

REFERENCES

[1] N. N. Buinov and V. P. Savinykh, *Doklad. Akad. Nauk*, **88** (2), 257-259.
[2] N. N. Buinov and R. M. Lerinman, *Izvest. Akad. Nauk. Fiz. Ser.*, No. 3, 363.
[3] A. P. Komar and B. Lazarev, *Zhurn. Exper. Tekh. Fiz.* **5**, 650.
[4] A. P. Komar and K. Ivanov, *Zhurn. Exper. Tekh. Fiz.*, **6**, 256.
[5] Sborn (collected works) on X-ray Studies of Materials, p. 47 (1949).
[6] D. G. Kurnosov and co-workers, *Zhurn. Tekh. Fiz.*, **18**, (2), 197.
[7] H. Wilsdorf and D. Kuhlman-Wilsdorf, *Naturwiss.*, **38**, 502.
[8] M. L. V. Gayler, *J. Inst. Met.*, 72 (8), 543.
[9] Ya. S. Umanskii *et al*, 'Fundamentals of Physical Metallography,' (1949).

Exemptions from KID

THE Treasury have made an Order under Section 10 (5) of the Finance Act, 1926, exempting the following articles from Key Industry Duty, for the period beginning 16 April, 1953, to 8 August, 1953:—

Synthetic organic chemicals, analytical reagents, other fine chemicals and chemicals manufactured by fermentation processes, the following:—

Chloropicrin

S-(1 : 2-Dicarboethoxyethyl) *OO*-dimethyl dithiophosphate (a methyl ester)

Dimethyl *iso*phthalate (a methyl ester)

3 : 5-Xylenol.

The Order is the Safeguarding of Industries (Exemption) (No. 3) Order, 1953, and is published as Statutory Instruments 1953, No. 617.

The British Association

Varied Fare at Forthcoming Annual Meeting at Liverpool

A FLOOD of scientific information—some of interest to the specialist and some of interest to the layman—will be provided at the annual meeting of the British Association for the Advancement of Science, which is to be held at Liverpool from 2-9 September.

The inaugural general meeting will be held in the Philharmonic Hall, Hope Street, on the evening of Wednesday, 2 September, when Sir Edward Appleton, G.B.E., K.C.B., F.R.S., will deliver his presidential address on 'Science for its Own Sake.' A special graduation ceremony will precede this meeting, in the same hall. Also in the Philharmonic Hall the next day the president will address student members on 'Finding Things Out with Radio and Rockets.'

The Association sections will begin their sessions on Thursday morning, 3 September. The Chemistry Section (Section B) will be accommodated in the Gossage & Mispratt Chemistry Laboratories, while the meetings of the Physics Section (Section A) will be held in the George Holt Physics Laboratories.

Professor G. R. Clemo, F.R.S., is the president of the Chemistry Section and the subject of his presidential address, which he will deliver on 3 September, will be 'The Development of Organic Chemistry Since the Time of Liebig.' This will be followed by individual papers on the same subject.

Merseyside Heavy Chemicals

Other subjects which will be discussed by the Chemistry Section include 'Heavy Chemical Industries of Merseyside' (Friday, 4 September); 'Chemotherapy and Antibiotics' (Monday, 7 September); and 'Transmutation (Modern Alchemy)' and 'New Materials and Their Possibilities' (both on Tuesday, 8 September).

In the Physics Section the presidential address by Professor Sir H. Jeffreys, F.R.S., on 'Applied Mathematics,' on 4 September, will be followed by papers on 'Magnetic Properties of the Earth's Interior.'

Members of the Association will be entertained by the Lord Mayor and Corporation of Liverpool at a reception on the evening of 3 September, and the University of Liverpool will entertain members at a reception in the University on the evening of 5 September.

Once again a large number of excursions, tours and visits to places of interest are being arranged. Industrial establishments to be visited by members in the Chemistry Section include Shell-Mex Refinery & Marketing Company, Ltd., Stanlow; Imperial Chemical Industries, Widnes; John Summers & Sons, Ltd., Shotton; J. Bibby & Sons, Ltd.; Tate & Lyle, Ltd.; and Lever Brothers, Ltd.

Visit to Isle of Man

By invitation of the trustees of the Manx Museum the annual meeting will be followed by a visit to the Isle of Man beginning on 9 September and ending on 12 September.

To meet a growing demand, the non-technical content of the programme will be increased for the Liverpool meeting. Scientific films will be used to illustrate individual papers and lectures and a programme of films on scientific subjects will be presented.

In connection with the meeting the Council of the Association have accepted a generous offer by Imperial Chemical Industries, Limited, as publishers of the quarterly scientific review, *Endeavour,* to give 100 guineas as prizes for scientific essays. Subjects for essays include 'Colour and Chemistry,' 'Scientific Contributions to Medicine' and 'Scientific Societies and Their Rôle.' Successful competitors will receive their prizes at the meeting. Further particulars of the competition may be obtained from the Assistant Secretary, British Association, Burlington House, Piccadilly, London, W.1.

The officers of the Chemistry Section will be: *President,* Professor G. R. Clemo, F.R.S.; *vice-presidents,* Professor C. E. H. Bawn, F.R.S., Dr. J. Ferguson, Professor T. P. Hilditch, C.B.E., F.R.S., Professor R. A. Morton, F.R.S., Professor A. Robertson, F.R.S., Professor E. C. Rollason, Professor W. Wardlaw, C.B.E., and Dr. C. G. Williams; *recorder,* Professor L. Hunter, University College, Leicester; *secretaries,* Dr. J. Dewar and Dr. D. C. Martin; *local secretaries,* Dr. A. Hickling and Dr. W. B. Whalley.

Photopolymerisation

Some Important Advances in Technique

PHOTOPOLYMERISATION both in nature and industry is a *modus operandi* whereby from the simplest of raw materials, complex molecules may be synthesised through the agency of solar energy. The most significant photopolymerisation in nature is that of photosynthesis whereby the intermediate activated formaldehyde is polymerised to form the simpler and more complex carbohydrate molecules.

Photosynthesis *in vitro* has at one time or other stirred the imaginations of organic chemists. The apparent simplicity of the raw materials with which the plant is able to synthesise relatively complex structures as the mono-, di- and polysaccharides has indeed intrigued scientists since the early days of Willstaeter, Nencki and Fischer.

Synthesis of Vitamin D

The mechanism of photosynthesis involving the use of the chlorophylls, xanthophylls and carotins was clarified in the early thirties and the importance of light quanta in certain organic reactions led to the ultimate synthesis of vitamin D, achieved by the irradiation of ergosterol with light in the region of 282-310$\mu\mu$ (B.P. 406,629). *Circa* 1932, a British patent (406,029) was granted for the synthesis of carbohydrates. The photosynthetic process described, although simple, appears to have attracted little attention, in view of the more complicated techniques extant; such contemporaneous methods involved subjecting formaldehyde solutions in the presence of nickel salts to the rays of a Hg vapour lamp.

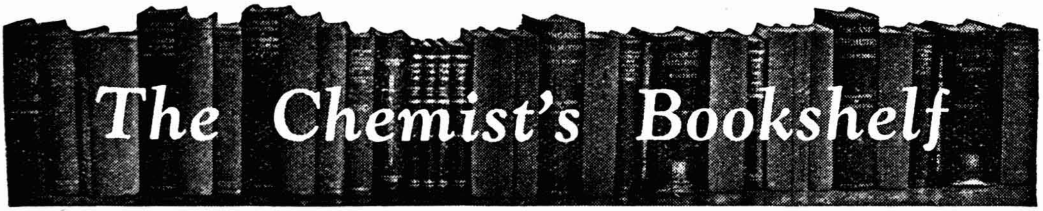
The claims of the British patent were simple and utilised a process of exposing H.CHO in a solution of milk of lime to either natural or artificial reddish orange rays. The artificial light was supplied from especially prepared bulbs of 25 watts each. By this process calcium saccharate was claimed to be formed, the free sugar being obtained by bubbling CO_2 through the solution, a known method for the purification of sucrose. The qualitative nature of the solutions does not appear to have been investigated in such experiments.

Since those days the study of photosynthesis *in vitro* has by the consummate skill of later chemists progressed considerably and in 1950 Hèrissey, utilising sols of chlorophylls and carotenoids in the presence of CO_2 and light, isolated such derivatives as glycollic aldehyde, methanol, higher aldehydes and other sugar intermediates, all representing stages in the building up of the sugar molecule. The presence of glycollic aldehyde illustrates the early aldol condensations of the activated H.CHO which progressively leads to the formation of the higher aldehydes and sugars.

Chlorophyll or the carotenoid extracts of the chloroplasts used alone in such experiments were found by Hèrissey to afford negative results and suggested that the requirements for effecting photosynthesis *in vitro* involve the auxiliary services of an antioxygenic agent. Such an agent would inhibit the oxidation of glycollic aldehyde to MeOH, and facilitate further aldol condensations implementing the synthesis of the carbohydrates and near derivatives. The rôle played by chlorophyll is still not fully understood and its chemical function is probably linked in some way with the Mg atom; thus the further work of Hèrissey in this respect is awaited with impatience.

Preparation of Vinyl Resins

Photopolymerisation has now found application in the preparation of vinyl resins, and such derivatives as vinyl acetate and styrene have been polymerised using light of wavelengths between 2,500 and 5,000 Å, the polymerisation being effected using between 0.01 and 5 per cent of an organic disulphide (B.P. 585,755). Using the same technique, vinyl halides and ketones have been polymerised in the presence of N-diethyl dithiocarbamates. New types of copolymers as those made from vinyl thiol esters and olefinic diesters have also been patented. In photopolymerisation processes the rate of polymerisation is related to the intensity of the incident light, and in the case of vinyl acetate, its polymerisation rate at 2.500 Å and at pressures above 20 mm. is proportional to the $\sqrt{}$-intensity of incident light, and below such pressures there is a rapid decrease in the polymerisation rates.—E.G.C.



The Chemist's Bookshelf

BRITISH PHARMACOPŒIA, 1953. General Medical Council. Pharmaceutical Press, London. Pp. xxiv + 894. 50s.

Only five years have elapsed since the last edition of the BP was published, and only two since the Addendum 1951 appeared, and yet the new volume will be found to be strikingly different from its predecessors. Undoubtedly the most important change is the use of English names instead of Latin: even though this results at times in what seems to be a somewhat arbitrary arrangement of monographs—codeine phosphate is followed by compound tablets of codeine and then by tablets of codeine phosphate—the general effect is one of much greater order. Busy pharmacists used to looking up all tablets under 'Tab.' and so on will find that all such compositions are cross-indexed under their general headings (in English) and that there is, moreover, a complete Latin index.

The standards and tests which must be complied with today reflect the way in which the production of pharmaceutical preparations has passed from the retail dispensary to the manufacturing laboratory. The 25 appendices describe chemical, physical and biological assay procedures which will require specialised apparatus not normally at the disposal of the pharmacist, particularly the appendix on biological assay, which includes a section on the design and accuracy of experiments.

The Commission has acted ruthlessly: in spite of the short interval which has elapsed since the last publication, the lists of deletions and additions are quite long. Among the 160 deletions such substances as dicoumarol, amidopyrine, sulphonal, ricinoleic acid and hexœstrol are obvious choices, but old favourites like glycerin of borax, potassium chlorate and tincture of squill will be mourned for some time. Interesting additions in the list of 60 include aureomycin hydrochloride, BCG, cyanocobalamin, ethyl biscoumacetate, folic acid, helium, maleic acid, methadone hydrochloride, phenadoxone hydrochloride and sodium aminosalicylate. Capsules and implants also appear for the first time.

From the chemical point of view, several improvements are timely. The chemical nomenclature has been brought into line with the recommendations of the International Union of Pure and Applied Chemistry; solubilities are given at 20° when possible; and the limits of arsenic are now given as As instead of As_2O_3. The appearance of the volume has also been improved, with a changed type face and style and a more dignified cover, and this is altogether a welcome new edition. Although published on 2 March it will not become official until 1 September.—B.I.

STATISTICAL METHODS FOR CHEMICAL EXPERIMENTATION. By W. L. Gore. Interscience, New York and London, 1952. Pp. xi + 210. $3.50.

This is the first in a new series of 'Interscience Manuals' which are designed to act as aids for the acquisition of new techniques in science and technology, both in laboratory methods and in the evaluating and recording of experimental results.

In the space available to the author it is not possible to present other than an introduction to the subject. No assumption is made at the beginning that the reader has any acquaintance with statistics, and the first two chapters are devoted to a quite elementary explanation of statistical concepts, which nevertheless moves rapidly enough to bring the reader up to a discussion of tests significance and the null hypothesis.

The speed becomes even more noticeable in the later part of the book, as may be judged from the remaining chapter-headings: The Reliability of Estimates: Analysis of Variance: Design of Experiments: Correlation and Regression: Attribute Statistics.

In order to cover the field theoretical derivations are largely ignored, and the approach is essentially practical. This could be misleading, and might induce some readers to assume that they have a more effective grasp of statistical methods than they really have—so that they then proceed to make faulty applications of the methods.

If the book is used wisely, however—that is, as a practical approach to be supplemented by a thorough study of the other works included in the bibliography, then it will be very valuable.

Alternatively, chemists who are familiar with other works on statistical methods, and who are at a loss to apply their knowledge to chemical procedures, will find this a useful guide, since the examples used have been well chosen from the point of view of a working chemist. In particular, the longest chapter of all, that on the design of experiments, will be found to discuss unfamiliar ideas in terms of familiar operations. The growing importance of some knowledge, on the part of all chemists, of the use and meaning of statistical methods makes the appearance of this book timely, and it can be recommended.—C.L.W.

INORGANIC CHEMISTRY. By E. de Barry Barnett and C. L. Wilson. Longmans Green & Co., London. 1953. Pp. xiv + 512. 35s.

This volume is a successful attempt to provide an advanced text-book suitable for students reading for a university degree or similar professional qualification. The authors presuppose a knowledge of physical chemistry somewhat above intermediate standard and a certain familiarity with elementary structural organic chemistry. Like many other text-books of inorganic chemistry the material in this work is divided into two sections. The first hundred or so pages summarise in eminently concise and understandable form the basic concepts of the classification of the elements, atomic weights and their determination, natural and artificial radioactivity, isotopes and isobars, atomic structure, stereochemistry and crystal chemistry and methods for the isolation of the elements. An important factor contributing to the value of this first section of the book is a neat little chapter on the chemical nomenclature of inorganic compounds, several recent references being given for further reading.

The remainder of the book is devoted to a detailed account of the occurrence, extraction, isolation, preparation and chemical properties of the elements. Noteworthy in this section are the notes on the artificially prepared post-uranium elements and the detailed chemistry of the so-called less common elements and the precious metals.

The book is so well-balanced and so refreshingly written that it would appear incongruous to select any one section as better than the others. The reviewer, however, has not seen in any text of comparable length a better treatment of the non-metallic elements.

Printing and proof reading have been so thorough that the text is remarkably free from typographical errors. 'Retailed' is written for 'retained' (p. xiii), the only proofing error the reviewer could find. However, the authors must surely know that iodine gives a blue colour with starch only in the presence of iodide ions (p. 484); indeed, the reaction is used as a sedative test for iodide.

These criticisms, do not, of course, detract from the value of a book which will serve admirably for the purpose for which it was written. This attractively bound volume should be a required text for every student specialising in chemistry, and constitutes an excellent addition to the literature of inorganic chemistry.—A. J. NUTTEN.

FUNDAMENTALS OF CHEMISTRY. By L. Jean Bogert. Seventh edition. W. B. Saunders Co., Ltd., London. 1953. Pp. 648. 22s. 6d.

This is one of those books for which (presumably, since it is now in its seventh edition) there is still a demand, books which set out to give the newcomer to chemistry a review of all its applications and diversions. And in its way this perhaps is more successful than most, even though the author, in his earnest attempts to make the matter intelligible with 'simple words,' sometimes confuses rather than clarifies a straightforward explanation.

The author, who is an American medical lecturer, has devoted more than a third of the book to biochemistry, including even a chapter on 'Uses of inorganic salts in the body,' and this is the best part of the book.

For those who intend to use this volume in the classroom there are numerous exercises and discussion topics, and the photographic illustrations, although generally of a poor quality, are sufficiently sensational to stimulate interest in the matter they accompany.—B.I.

· HOME ·

Aluminium Trade Recession

Owing, it is stated, to a trade recession in aluminium sheet, the Northern Aluminium Company, of Rogerstone, Mon., recently discharged 100 workers as redundant. The total number of workers dismissed since January is now 453. For some time, 800 of the 3,700 employees have been working short-time.

Vacation Oil Work

Men studying to become chemists, chemical engineers, physicists, engineers and geologists will be among 80 undergraduates, including several from Continental countries, who will spend their summer vacation working at the Anglo-Iranian Oil Company's refineries at Llandarcy, Grangemouth and the Isle of Grain, and research stations at Sunbury and Kirklington Hall.

Engineering Centre to Close

The closing down of the Engineering Centre, Glasgow, on 30 September is announced by the directors in a letter sent to all exhibitors terminating the contract for exhibition space as from that date. It has been found that there is a tendency for certain industries, trade associations and large manufacturers to prefer arranging their own displays of products in selected areas, and it is felt that when these new sectional enterprises become firmly established it would be impossible to continue the existing Engineering Centre as a permanent exhibition which would be truly representative of the engineering industry as a whole.

Terylene Council to Move

The Terylene Council, whose headquarters are at Welwyn, will be moving to Harrogate within the next 18 months. The new accommodation will be centred on an 18th century mansion, Crimple House. Offices and laboratories to house members of the staff are now being built on the surrounding estate. The move will take the Council nearer to the Terylene plants at Hillhouse and Wilton, and to the Yorkshire and Lancashire textile districts, where much of the yarn and fibre is processed.

Smokeless Zone Planned

Preparations are being made by Liverpool Health Department for the setting up of a smokeless zone in the centre of Liverpool and it is hoped that application will be made to Parliament for the necessary powers within a year. This was revealed recently by Dr A. B. Semple (Liverpool's Medical Officer), after he had addressed a special meeting of the North-West Division of the National Smoke Abatement Society.

Fertiliser Tests

The Ministry of Agriculture and Fisheries has been given £41,000 by the American Mutual Security Agency towards the cost of a series of demonstrations of the use of fertilisers on English and Welsh farms.

Fatal Industrial Accidents

The number of workpeople in the U.K. whose deaths from accidents in the course of their employment were reported in February was 121, compared with revised figures of 101 in the previous month and 114 in February, 1952. Although only six deaths were reported in chemicals, oils and soap factories, this figure was higher than for some time in these industries.

Chemical Employment

Total numbers employed in the chemical and allied trades in Great Britain in January remained steady at 483,300 compared with 483,200 at the end of December, 1952, according to the industrial analysis in the *Ministry of Labour Gazette* (Vol. LXI, No. 3). The total figure was, however, 9,300 fewer than at the end of 1951.

Tar Fire Quickly Controlled

When a storage tank exploded and caught fire on 1 April at the Clark Street factory in Paisley of Scottish Tar Distillers, Limited, hot tar was thrown high into the air and tar vapour scattered over a wide rea. When he heard the explosion, Mr. William Ramsay, manager of the works, went to the tank, and climbing a ladder, directed foam from a hand extinguisher on to the rim, where lagging had caught fire. When the fire brigade arrived more foam was poured on the oil, and control of the fire was quickly gained.

• OVERSEAS •

Zinc & Lead from Australia

The Australian Government has lifted all controls on the export of zinc and lead as virgin metal, residues or scrap. The controls have been steadily eased over recent months.

New Copper Mine in Peru

An American concern will shortly put into production a copper mine in Toquepala, about 10,000 ft. up in the Andes in southern Peru. Deposits are estimated at over 400,000,000 tons of copper ore with an average content of 1 per cent. This will be one of the largest copper mines in the world and an investment of some U.S. $160,000,000 will be required. Production is expected to be about 100,000 tons a year for the first ten years.

Canadian Tariff on Glycol Mixtures

A 20 per cent tariff increase in glycol mixtures used in the manufacture of anti-freeze was imposed by the Canadian Tariff Board last month. The board ruled that such mixtures—which include di-ethylene, tri-ethylene and propylene glycol—are not ethylene glycol, which is permitted into Canada duty-free. This ruling allowed the appeal of Dow Chemical, Limited, of Sarnia, Ontario, which has erected a multi-million dollar plant for the production of anti-freeze ingredients.

Threat to Chile Nitrate Plants

An announcement by the C$^{ia.}$ Salitrera de Tarapacá y Antofagasta that, because of the burden of taxation, its four niirate plants may have to close, has raised alarm among workers. The company claims that, unless relief is forthcoming, the whole industry will disappear in about four years. The Finance Minister has stated that the Chilean Government will seek means to avoid the closure of the plants and also, that the Government is considering the erection of a large new nitrate plant with a yearly production capacity of 400,000 tons and the mechanising of other plants, in order to provide more favourable conditions under which to meet competition from the synthetic nitrate producers. Competition from Europe during the past four months has forced the price of natural nitrate down from U.S. $45/50 a ton to U.S. $40/45.

Lignite Deposits in Madras

The Madras Minister for Industries, Dr. U. Krishnarao, inaugurated an experimental project for exploitation of lignite deposits in Madras at Naiveli, near Cuddalore, on 5 March. It is estimated that Madras has about 2,000 million tons of lignite deposits spread over an area of 100 square miles. The deposits have been found to be of the highest quality, and the object of the experiment is to investigate the prospects for commercial mining. It is expected to cost about Rs. 8,000,000.

South African Minerals

South Africa's first uranium plant went into operation on the West Rand Consolidated Mines. Up to the end of the year, twenty-two gold mines had contracted with the South African Atomic Energy Board to produce uranium, six of them in the Free State. A discovery which may prove of considerable importance has recently been made at the small seaside resort of Umgababa, about 25 miles to the south of Durban, where a small hill has been found to hold rich deposits of three mineral ores, ilmenite, zircon, and rutile, which is almost pure titanium. Mining operations are expected to commence soon.

New Plant in Brazil

There has been a change of plans in connection with the establishment of a large-scale industry in Brazil for the production of soda ash, caustic soda and allied products. Although financing by the Export-Import Bank or the International Bank for Reconstruction and Development was at first considered, contracts have now been signed between the C$^{ia.}$ Nacional de Alcalis and two French concerns for the financing and installation of the necessary equipment at Cabo Frio, at a cost of up to U.S. $15,000,000, or the equivalent in French francs. In addition, the Brazilian officially-controlled National Economic Development Bank will finance the project to the extent of Cr. 180,000,000. The proposed plant will have an annual production of 100,000 tons of soda ash, from which 20,000 tons of caustic soda and various quantities of other chemicals will be derived.

· PERSONAL ·

COUNCILLOR A. SWINBANK has resigned from Middlesbrough Town Council, having secured an appointment with Imperial Chemical Industries, Limited, Welwyn (Herts) as chief accountant on the Terylene Council. He has been commercial manager of the I.C.I. Wilton Works.

MAJOR W. R. BROWN, works director in charge of the blastfurnace side of the Stockton-on-Tees works of Ashmore, Benson Pease & Co., has received an award to mark his completion of 25 years with the firm. Major Brown is also a director of the firm's parent organisation, the Power-Gas Corporation.

MR. FREDERIC L. GOODALL, of Wilmslow, Cheshire, joint managing director of the Geigy organisation, who was elected president of the Society of Dyers and Colourists at their 69th annual dinner at the May Fair Hotel, London, on 10 April, was educated at Leeds Grammar School and Leeds University, graduating in 1922 with a first-class honours degree in colour chemistry and dyeing. Author of a number of publications on technical problems, his best known work is 'The High Temperature of Dyeing' on wool dyeing, published in 1937.

At the annual meeting of the Huddersfield section of the Society of Dyers and Colourists the following officers were elected: *Chairman*, MR. E. ROLFE; *vice-chairman*, MR. R. W. SHACKLETON; *secretary*, MR. H. TURNER; *committee*, Messrs. R. L. ROBINSON, D. HANSON, G. K. SEDDON, J. CALVERT, J. A. WALWORK, H. BOOTHROYD, F. GREENHOUGH, W. W. ENGLAND, J. STEEL, G. ENGLAND, P. ROBINSON, and F. JORDINSON.

MR. JAMES EWING, chairman, and MR. PERCY A. HOLT, joint managing director, of the Bradford Dyers' Association, sailed on 7 April on a visit to the U.S.A. and Canada. They are visiting subsidiary companies in Providence, Montreal, Drummondville, near Quebec, and Cobourg (Ontario). Mr. Ewing will stay about three weeks, but Mr. Holt, who is engaged on the technical side, will be remaining some time longer.

Recent appointments by Imperial Chemical Industries Ltd., are as follows:— MR. L. B. RYDER, chairman of the Lime Division; DR. S. W. SAUNDERS, Billingham Division managing director (jointly with MR. W. B. SCOTT); MR. D. M. BELL, to the Billingham Division Board; MR. E. HENDERSON, MR. G. W. INNES and MR. G. A. RICHMOND, to the Alkali Division Board; MR. F. STEADMAN, to the Plastics Division Board; MR. S. B. CORMACK and MR. C. G. HARRIS, to the board of the General Chemicals Division.

MR. C. E. PROSSER has been appointed chairman of the Metals Division of Imperial Chemical Industries Ltd., in succession to MR. H. E. JACKSON, who relinquished the chairmanship on 31 March. Mr. Jackson is retiring from the Metals Division at the end of June, when he terminates his present year of office as president of the British Non-Ferrous Metals Association. Mr. Jackson is well known as a representative of the non-ferrous metal industry, but has been principally associated with the technical and commercial aspects of shotgun and metallic ammunition manufacture. At the time of the I.C.I. merger, in 1926, Mr. Jackson had already completed 14 years' service with the three firms—Nobel, Eley and Kynoch—whose ammunition interests had by then been concentrated in Birmingham. Joining the board of I.C.I. Metals Division in 1933, Mr. Jackson was appointed joint managing director in 1939, acting chairman in 1942 and chairman two years later. His other official appointments include membership of the Regional Council, Federation of British Industries; the presidency of the Aluminium Development Association (1948/9); and chairmanship of the Aluminium Industry Council (1948/9 and 1951/2). Mr. Prosser, Mr. Jackson's successor, was appointed to the board of I.C.I. Metals Division in 1936. He has played a prominent part in the counsels of the non-ferrous metal industry. A former chairman of the Brass Wire Association and the Copper Tube Association, he headed the panel which, during the Second World War, was responsible to the Government for output of non-ferrous tube and tube products. His official appointments include chairmanship of the International Relations Sub-Committee of the British Non-Ferrous Metals Federation, the Non-Ferrous Wrought Metals Export Group, the Manufacturers Copper Association and the Condenser Plate Association. Mr. Prosser joined Elliott's Metal Company, Limited, in 1910 and on this firm's incorporation in I.C.I. was appointed metal sales manager. He was appointed commercial managing director of the Metals Division in 1944.

The President of the Board of Trade announced recently to the House of Commons that SIR HENRY WILSON SMITH, a director of Vacuum Oil Company, is to be chairman of an independent committee to review the long-term problems of duty-free entry of machinery into the U.K. Terms of reference of the committee are to consider and report whether it is in the national interest to provide for the duty-free admission into the U.K. of machinery, either by classes or in individual consignments. The committee will also review the provisions and administration of Section 10 of the Finance Act, 1932. Sir Henry is a director of a number of other companies, including Powell Duffryn, Cury Brothers & Company, and Guest, Keen & Nettlefolds, and is a vice-chairman of Stephenson Clarke.

MR. GEORGE WILSON, deputy labour manager of the I.C.I. Billingham Division, has been appointed Nobel Labour manager.

MR. T. G. AUSTIN, I.C.I. Metals Division personnel manager, has been appointed to the division board and delegate boards of Marston Excelsior, Limited, and Lightning Fasteners, Limited.

The Alkali Division of I.C.I. has two new joint managing directors, MR. J. W. GIBB and MR. E. J. LANGFORD. Both have been division directors since 1945 and are chemists —Mr. Gibb a graduate of Edinburgh University and Mr. Langford of Oxford.

MR. G. H. BEEBY, the new chairman of the Salt Division of I.C.I., who succeeds MR. C. R. PRICHARD, joined the firm in 1929 as a research chemist at Billingham. He has been director in charge of commercial activities, and director of Thorium, Limited, and of British Titan Products, Limited.

Sulphur Committee Terminated

THE Sulphur Committee of the International Materials Conference announced recently that its member governments have agreed to the dissolution of the committee on 30 April, 1953. This announcement follows the committee's recent decision to discontinue international allocation of crude sulphur as from 1 March and reflects the continuing improvement in the supply and demand position of sulphur in the free world.

The Sulphur Committee, which was the second of the commodity groups to be established within the framework of the IMC, met for the first time on 1 March, 1951. The committee's recommendations for the first international allocations of crude sulphur were accepted by its member governments for the third quarter of 1951 and allocations were continued on a quarterly or half-yearly basis until 1 March, 1953.

The following countries were represented on the committee: Australia, Belgium (representing Benelux), Brazil, Canada, France, the Federal Republic of Germany, India, Italy, Japan, Mexico, New Zealand, Norway, Sweden, Switzerland, the Union of South Africa, the United Kingdom and the United States.

Traders' Luncheon

The annual luncheon of The British Chemical & Dyestuffs Traders' Association is being held at the Savoy Hotel, on Tuesday, 21 April. The principal speakers will be Lord Mancroft and Mr. W. F. Deedes, M.P. The president and Council will receive guests at 12.30 p.m. and lunch will be served at 1 p.m.

Organo-Mercury Compounds

Development of the modern organo-mercury compounds will be the subject of a paper to be delivered by Dr. J. R. Booer (F. W. Berk & Co., Ltd.) following the annual general meeting of the Crop Protection Panel of the Agriculture Group of the Society of Chemical Industry on Monday next (20 April) at Burlington House, London. Details of the panel's summer outing to the Imperial College of Science, Field Station, at Silwood Park, on Wednesday, 1 July, will be announced shortly.

Publications & Announcements

EDUCATIONAL Productions Limited have published, in collaboration with the British Oxygen Co., Ltd., two wall charts for schools on the production of oxygen and acetylene respectively. These are printed boldly in sufficient colour to make them clear but not confusing, and schoolteachers should find them popular with their classes. Collaboration with BOC means not only that the information on the charts is authentic, but that they may be sold at 1s. each instead of the normal published figure of 5s. The charts are 19 in. x 24 in., and a companion sheet on iodine has been published in collaboration with the Chilean Iodine Education Bureau.

* * *

RICHARD KLINGER LIMITED, Klingerit Works, Sidcup, Kent, have just published a completely revised and considerably expanded edition of the Level Gauge Section of their catalogue. This new section, which comprises over 60 pages, contains full details of the company's water level indicators, double-plate water level gauges, water-gauge columns, gauge-glass protectors, glasses and spares. In addition, it includes a full description of Klinger level gauges for the oil industry, such as the Type 'U' and Type 'K' reflex gauge, the Type 'J' and Type 'J.A.' double-plate gauges, level gauges for liquefied gases (Hubbard Patent) and high-pressure reflex-level indicators (for working pressures up to 6,000 p.s.i.) all of which are used on an increasing scale in U.K. and overseas refineries. Klinger steam-heated level gauges, non-frosting level gauges, and inter-surface level gauges, perspex flameproof illuminators and other Klinger specialities for the oil industry are also referred to. The value of this publication, copies of which may be obtained upon request from the above address, is enhanced by over 80 illustrations and tables.

* * *

RECENT investigations by trenching indicate that up to 500 tons of pyrolusite ore containing 44 to 55 per cent of manganese and up to 15 per cent of silica are available in the Marshall's Hall area of Jamaica. In the current issue of *Colonial Geology and Mineral Resources* (Vol. 3, No. 2), V. A. Zans, Mag. Rer. Nat. Habil. (senior Geologist, Geological Survey Department, Jamaica, B.W.I.), describes the deposits and points out their importance, as there is good evidence that several richer veins may be present which may well prove of commercial interest. Among the laboratory investigations of the Mineral Resources Division selected from recent reports, W. H. Bennett and R. Pickup write on 'The Determination of Some Minor Ingredients of Silicate Rocks.' Photometric methods are given for determining chromium, vanadium, nickel and phosphorus. Results are compared with those obtained by the semi-quantative cathode-layer spectrographic method.

* * *

THE APRIL edition of the quarterly review *Endeavour* (No. 46, Vol. XII) contains the usual range of articles recording the progress of the sciences in the service of mankind. They include 'Tracer Technique in Biosynthesis,' by Dr. J. W. Cornforth; 'Alkaloids in Plants,' by Dr. W. O. James; and 'Polyelectrolytes,' by Dr. A. Katchalsky. *Endeavour* is published by Imperial Chemical Industries, Limited, Millbank, London, S.W.1.

* * *

THE first in the 1953 series of 'Lectures, Monographs and Reports' published by the Royal Institute of Chemistry is 'The Chemistry and Toxicology of Organic Fluorine and Phosphorus Compounds' by Bernard C. Saunders, M.A., Ph.D., Sc.D., D.Sc., F.R.I.C. This monograph, which is based on a lecture given by Dr. Saunders before the London Section of the Royal Institute of Chemistry at the Waldorf Hotel, London, on 19 March, 1952, is concerned mainly with two types of organic fluorine-containing compounds—the phosphorofluoridates containing the $>$POF group and a large group of compounds containing the FCH_2 group and designated loosely as fluoroacetates. Work was undertaken on these compounds by the author and his colleagues at Cambridge as early as 1939 when little was known about them and he has played a tremendously important rôle in increasing knowledge of the new organic chemistry of phosphorus and fluorine during the last decade. Copies, price 4s. net, may be obtained from the offices of the RIC, 30 Russell Square, London, W.C.1.

DETAILED technical instructions for the use of laboratory technicians who employ the Lovibond Comparator are contained in 'A Handbook of Colorimetric Chemical Analytical Methods for Industrial, Research and Clinical Laboratories' (15s. 6d. post paid), published by The Tintometer, Ltd., The Colour Laboratory, Salisbury. Each method is the result of collaboration with one or more leading laboratories, chosen as being the recognised authority on that particular test. The volume therefore represents an unique selection of considered methods analysis contributed by leaders of this work from all over Britain. The techniques have been worked out in detail as being the most reliable method of performing that particular test and may, of course, be employed even where the Lovibond Comparator is not used. Part 4 (Commercial Grading Tests) and Part 6 (Toxic Gases in Air) have been omitted from this volume as being of more specialised interest. New discs for new tests are constantly being added to the Lovibond range and suggestions for additions are welcomed.

* * *

THE present edition of the Statistical Summary of the Mineral Industry, formerly published for the Imperial Institute, covers the seven-year period 1945 to 1951 and is obtainable from HMSO at £1 7s. 6d. Comprehensive details are given of the production, imports and exports of some 60 minerals and metals, arranged in alphabetical order from abrasives to zirconium. In accordance with previous practice, production tables for copper, lead, tin and zinc show output of ore in terms of metal as well as smelter production. The section on coal deals with coke, briquettes and the chief coal by-products, while that on petroleum is concerned with crude petroleum, natural gasoline, natural gas, asphalt, oil-shale and the chief refinery products. The iron and steel section gives information on iron-ore, pig-iron, ferro-alloys and steel.

* * *

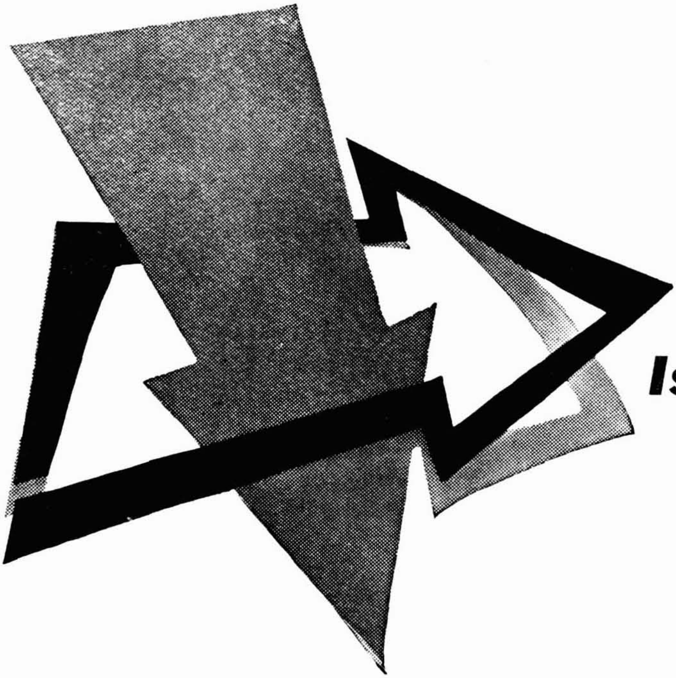
RESULTS obtained with the Monsol Germicides produced by Melanoid, Limited, Dudley Port, Tipton, Staffs, have fully justified the eight years' research which preceded their introduction. In this time a team of chemists, bacteriologists and pathologists were continually testing and evaluating the products, not only in laboratory experiments, but also clinically in hospitals. The range of Monsol liquid germicides and antiseptics now available are: Neo-Monsol, an amber-coloured clear fluid, which, when diluted with water, makes a stable milky emulsion; Monsola, which has the general characteristics of Neo-Monsol and was introduced to fill the need for a germicide not quite so highly refined and therefore cheaper to produce; and Monsol Pine Fluid, specially formulated for use when a mild antiseptic is required, combined with a deodorant action and the creation of a pleasant, fresh atmosphere. Further information about these products is given in a new bulletin.

* * *

A NEW instrument, the 'Pneumerstat,' is described in a booklet just issued by Williams and James (Engineers), Limited, of Gloucester. The instrument has recently been developed by the company in collaboration with the Dyestuffs Division of Imperial Chemical Industries, Limited, for which it is in quantity production. The instrument combines the duties of a Bubbler chamber, pressure reducing valve and needle valve, for use on applications to control the supply of compressed air when this is used for purposes such as the indication of content, level or pressure. 'Pneumerstats' have also been used for the regulation, with great accuracy, of a slow feed of water for laboratory tests, and in the continuous sampling of gas for analysis of Shed Atmosphere and Absorption Tower Outlets. In the latter case, however, it must be arranged that the corrosive gas is not allowed to come into contact with the 'Pneumerstat.' Chief advantages of the new instrument are that it gives a constant flow; eliminates the human element; can be used for open or closed vessels under pressure or vacuum; and prevents air leaks since there are fewer joints. It will be seen at the British Instruments' Exhibition at Olympia, London, in July.

* * *

THE latest issue of 'BASF' published by the Badischen Anilin & Soda Fabrik, is the first of the third volume. The contents include two illustrated articles on 'The Oldest German Distillation Book' and 'Distillation and Sublimation in Old Florence'; other articles are on 'Commercial Distillation,' 'The Components of Air and Coal-Gas,' 'Automatic Processes,' 'Men and Technology' (a brief historical survey), 'Selection and Development of the New Generation of Chemists' and an illustrated article on the work of Carl von Linde.



Methyl Isobutyl Carbinol

A new medium-boiling solvent in the Shell U.K.-produced range, especially useful as a latent solvent in lacquer formulations, promoting good flow and blush resistance. Valuable in hot spray lacquers because of its evaporation characteristics, and as a solvent in synthetic enamels including phenolic baking type can coatings. Ask for Information Sheet No. 259.

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Shell METHYL ISOBUTYL CARBINOL is produced to a high degree of purity and conforms to the following specifications:—

PURITY: Minimum 97.5% METHYL ISOBUTYL CARBINOL by weight.

SPECIFIC GRAVITY: at 20/20°C.: 0.807-0.809.

COLOUR (platinum-cobalt standard, Hazen) Maximum 15.

ACIDITY (other than carbon dioxide) Max. 0.005% wt. (as acetic acid).

DISTILLATION RANGE (A.S.T.M.D. 268) Below 130°C.: none. Above 133°C.: none.

WATER: No turbidity when 1 volume is mixed with 19 volumes of I.P. Petroleum Spirit at 20°C.

PHYSICAL CONSTANTS OF PURE METHYL ISOBUTYL CARBINOL

Boiling Point ...	760 mm.	131.63°C.
Refractive Index ...n_D^{20}		1.4113
Vapour Pressure (mm. Hg.)	10°C.	0.9
	20°C.	2.1
	30°C.	4.6
Latent Heat of Vaporisation		104.0 cal/g.
Surface Tension ...	20°C.	22.8 dynes/cm.

SHELL

Shell Chemicals Limited, Norman House, 105-109 Strand, London, W.C.2. *Tel: Temple Bar 4455*
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Divisional Offices: Walter House, Bedford St., London, W.C.2. *Temple Bar 4455*, 42 Deansgate, Manchester 3. *Deansgate 6451*
Clarence Chambers, 39 Corporation St., Birmingham 2. *Midland 6954*. 28 St. Enoch Square, Glasgow, C.1. *Glasgow Central 9561*
53 Middle Abbey Street, Dublin. *Dublin 45775*. 35-37 Boyne Square, Belfast. *Belfast 20081*.

Next Week's Events

MONDAY 20 APRIL

Royal Institute of Chemistry

Gillingham: Medway Technical College, Gardiner Street, 7 p.m. London Section. Dr. K. G. A. Pankhurst: 'The Physics and Chemistry of Detergent Solutions.'

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 5.30 p.m. Crop Protection Panel of the Agricultural Group. Annual general meeting, followed by paper delivered by Dr. J. R. Booer.

TUESDAY 21 APRIL

Society of Chemical Industry

London: Royal College of Science, S.W.7, 2.30 p.m. Dr. H. L. Penman: 'Estimating the Water Requirements of Plants.'

Society of Instrument Technology

Manchester: College of Technology, 7.30 p.m. A. Macklow Smith: 'Principles and Applications of the Hydraulic Load Cell.'

WEDNESDAY 22 APRIL

Society of Chemical Industry

London: Burlington House, Piccadilly, W.1, 6 p.m. 15th annual general meeting of the Nutrition Panel of the Food Group. 'Food and the Future,' fourth in a series of lectures. Dr. W. F. J. Cuthbertson: 'Synthetic Food Potentialities.'

Manchester Literary & Philosophical Society

Manchester: The Portico Library, Mosley Street, 5.45 p.m. Annual general meeting of the Chemical Section.

THURSDAY 23 APRIL

The Fertiliser Society

York: Royal Station Hotel, 2.30 p.m. 'Ammoniation of Superphosphate,' followed by discussion.

Institution of Chemical Engineers

London: May Fair Hotel, Berkeley Street, W.1, 11 a.m. 31st annual corporate meeting; 12 noon President's address: 'Changes in Roasting Practice and Furnace Design'; 7 p.m. annual dinner. At 3 p.m. in the British Council film theatre there will be a showing of the film 'The Stanlow Story,' by courtesy of the Shell Refining & Marketing Co., Ltd. (Admission by ticket only).

Manchester Microscopical Society

Manchester: 16 St. Mary's Parsonage, Deansgate, 6.30 p.m. Open evening.

The Royal Society

London: Burlington House, Piccadilly, W.1, 4.30 p.m. Sir Geoffrey Taylor: 'Experimental Study of Standing Waves'; T. V. Davies: 'Forced Flow of a Rotating Viscose Liquid which is Heated from Below.'

Institution of Engineering Inspection

Manchester: Engineers' Club, Albert Square, 7.30 p.m. Film show: 'Introduction to Die Casting'; 'Right Material in the Right Place'; and 'Powder Metallurgy I and II.'

FRIDAY 24 APRIL

The Chemical Society

St. Andrews: United College, 5.15 p.m. Joint meeting with the University Chemical Society. Dr. F. Fairbrother: 'Metal Halide Catalysts.'

Hull Chemical & Engineering Society

Hull: Church Institute, Albion Street, 7.30 p.m. Annual general meeting.

Plastics Institute

Manchester: Engineers' Club, Albert Square, 6.45 p.m. J. Butler (British Industrial Plastics, Limited): 'Practical Do's and Dont's in Tool Design (Transfer)'

Oil Exhibition to Tour Museums

THE first scientific and technical oil exhibition ever designed expressly for a museum public will be on view in the City Museum, Bristol, from 9 April-2 May, 1953, prior to touring other provincial museums. Developed by Shell, the exhibition aims both to attract and to educate and is readily understandable without the need for accompanying lectures or explanatory talks. It traces the story of oil from its origin, through exploration, drilling and oil field development to the different means of transport; from refining, manufacture and research to the distribution of products to consumers.

This is done by 22 portable display cases, one or more of which are devoted to each of the 15 subjects into which the activities of the industry have been divided. The treatment of the displays differs: some include models, reliefs or dioramas; others are purely photographic with pictures of high artistic merit as well as of technical interest. Each display is fully captioned, and there is a descriptive leaflet available to visitors.

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The ROBBICAN

"AMERICAN" PAILS

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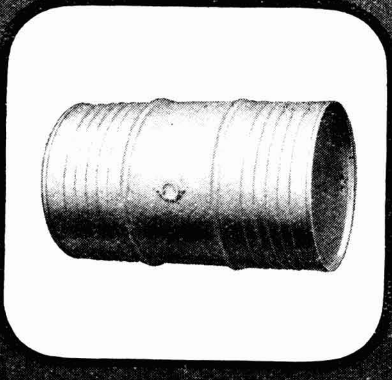

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Commercial Intelligence

New Registrations

A. Boake Roberts & Co. (Manufacturing) Ltd.

Private company. (517,983.) Capital £100 in £1 shares. To carry out the business of chemical manufacturers, chemists, distillers and drysalters, etc. First directors are not named. Solicitors: Coward, Chance & Co., St. Swithin House, Walbrook, London, E.C.4.

Chlorophyll & Derivatives Ltd.

Private company. (517,989.) Capital £10,000 in 10,000 ten per cent cum preference shares of 5s. and 7,500 ordinary shares of £1. Manufacturers, importers and exporters of and dealers in all kinds of chlorophyll and allied products. Directors: Philip Blackman and Adolph Perelmann. Reg. office: 1 Lawrence Pountney Hill, London, E.C.4.

Dormar Laboratories (England) Ltd.

Private company. Capital £2,500 in £1 shares. To acquire patents and inventions, and to carry on the business of manufacturers of and dealers in plasters of all kinds, cement, limes, etc. Directors: John H. Cook and Legender W. Myers. Reg. office: 20 Kinnerton Street, Knightsbridge, London, S.W.1.

Fleming Dent & Co. Ltd.

Private company. (518,192.) Capital £1,000 in £1 shares (900 seven per cent redeemable cum preference and 100 ordinary). Manufacturing chemists. Directors: Captain Robert S. T. Fleming and John A. Dent. Reg. office: 6/7 Queen Street, London, E.C.4.

Howards of Ilford Ltd.

Private company. (518,132.) Capital £100 in £1 shares. To acquire for the purpose of reconstruction, the business of Howard & Sons, Ltd., and to carry on the business of manufacturing pharmaceutical and analytical chemists, druggists, drysalters, etc. First directors to be appointed. Solicitors: Linklaters & Paines, 6 Austin Friars, London, E.C.2. Reg. office: Uphall Works, Ilford.

Laporte Chemicals Ltd.

Private company. (518,066.) Capital £100 in £1 shares. To acquire certain property and assets mentioned in an agreement made between the company and Laporte Industries, Limited, and to carry on the business of manufacturers of and dealers in chemical and allied substances. First directors: not named. Solicitors: Slaughter & May, 18 Austin Friars, London, E.C.2.

Company News

The Distillers Company

The directors of The Distillers Company, Limited, announce that they have declared a dividend on the preference capital of the company for the six months ended 31 March, 1953, at the rate of three per cent less income tax, payable on 15 May, 1953, to stockholders on the register at 1 April, 1953.

F. W. Hampshire & Co.

Consolidated trading profit of F. W. Hampshire & Company for the year ended 5 December, 1952, was £161,770. Profit, before tax but after depreciation, directors' emoluments, audit, etc., was £114,499.

Rediweld Ltd.

Agreement has been reached between Rediweld, Limited, Crawley, and the Eco Engineering Company, Newark, New Jersey, U.S.A., whereby the former will act as exclusive sales representatives for the all-Teflon and stainless steel pumps of Eco Engineering Company. These self-priming pumps are manufactured in two sizes and will handle almost any corrosive liquids at high temperatures. Rediweld have also concluded an exclusive sales agreement with the United States Gasket Company, of Camden, New Jersey, U.S.A., and will act as their representatives for the United Kingdom. The U.S. Gasket Company is the most important Teflon processor in the United States, moulding and laminating Teflon and Kel-F in all shapes and sizes.

Tarmac Ltd.

The balance sheet of Tarmac Limited, for 1952 shows group trading surplus as £684,931, as compared with £606,722 for the previous year. Dividend totals £69,328 (same) and includes 15 per cent on ordinary shares.

Market Reports

LONDON.—Active trading conditions have been reported from most sections of the industrial chemicals market and deliveries against contracts have been called for in good quantities. Overseas demand remains only moderate, but a better volume of inquiry for new business on home account has been in evidence. The chief price alterations of the week have been an increase, as from 13 April, of 10s. per ton in the quotations for nitric acid, sodium nitrite, sodium nitrate, ammonium nitrate, oxalic acid, formic acid. Anhydrous ammonia is a farthing a lb. cheaper. The makers state that these changes are necessary because of the recent increase in the price of coal and coke. Cream of tartar is 20s. per cwt. cheaper for minimum ten cwt. lots. The movement in the coal tar products market has remained steady with new business limited to spot or nearby requirements. Naphthalene quotations are lower.

MANCHESTER.—The demand for chemical products in the Manchester area has made a quick recovery after the holiday and a fair volume of new business has been placed Duffryn, Cory Brothers & Company, and during the past week. Contract deliveries of caustic soda, soda ash and most other heavy chemicals, including the ammonia, magnesia and potash compounds, have been on reasonably steady lines, and inquiries on export account have been maintained at around their recent level. A satisfactory movement of supplies of superphosphates and other fertiliser materials has again been reported. In the tar products section a steady demand for most of the light distillates is being experienced and values are firm.

GLASGOW.—Due probably to the Easter break, trading in the earlier part of the week was quiet. However, this was off-set by a good demand later in the week and business for both prompt and forward delivery has been quite good. The last few days have brought some quite interesting inquiries from overseas and the prospects appear to be favourable.

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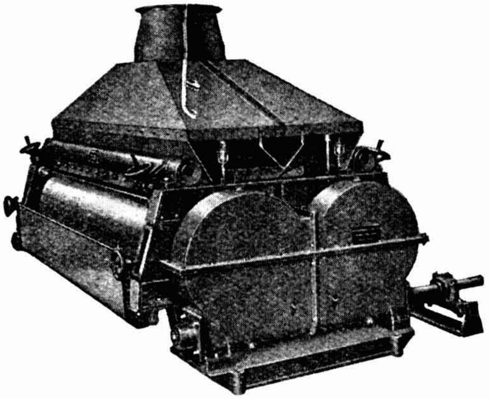

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CLASSIFIED ADVERTISEMENTS

EDUCATIONAL

THE INSTITUTION OF CHEMICAL ENGINEERS

29TH (1953) ASSOCIATE MEMBERSHIP EXAMINATION

APPLICATION forms (returnable June 1st, 1953) and particulars of the 29th Associate Membership Examination, may be obtained from the Secretary, **INSTITUTION OF CHEMICAL ENGINEERS, 56, VICTORIA STREET, LONDON, S.W.1.** Sections C, D, E and F of the examination will be held in September, 1953, and the Home Paper (Sections A and B) will be issued at the end of September for return 15th December, 1953.

SITUATIONS VACANT

***The engagement of persons answering these advertisements must be made through a Local Office of the Ministry of Labour or a Scheduled Employment Agency if the applicant is a man aged 18-64 inclusive, or a woman aged 18-59 inclusive, unless he or she, or the employment, is excepted from the provisions of the Notifications of Vacancies Order,* 1952.**

EXPERIMENTAL OFFICERS AND ASSISTANT EXPERIMENTAL OFFICERS in various Government Departments. The Civil Service Commissioners invite applications for pensionable posts. Applications may be accepted up to December 31st, 1953, but an earlier closing date may be announced either for the competition as a whole or in one or more subjects. Interviews will generally be held shortly after the receipt of the completed application form.

The posts are divided between the following main groups and subjects:—(*a*) Mathematical and Physical Sciences; (*b*) Chemistry and Metallurgy; (*c*) Biological Sciences; (*d*) Engineering subjects; and (*e*) Miscellaneous (including e.g., Geology, Library and Technical Information Services).

AGE LIMITS. For Experimental Officers, at least 26 and under 31 on December 31st, 1953; for Assistant Experimental Officers at least 18 and under 28 on December 31st, 1953. Extension for regular service in H.M. Forces.

Candidates must have obtained, or be taking examinations during 1953 with a view to obtaining the Higher School Certificate with Mathematics or a Science subject as a principal subect, or the General Certificate of Education in appropriate subjects, or the Higher National Certificate or other specified qualifications. Candidates without such qualifications may be admitted exceptionally on evidence of suitable experience. Candidates over 22 will generally be expected to have higher qualifications.

Inclusive London salary scales:—

Experimental Officer: £628-£786 (men); £533-£655 (women).

Assistant Experimental Officers: £274-£586 (men); £274-£490 (women).

Starting pay according to age up to 26: at 18, £274; at 26, £495 (men), £467 (women). Somewhat lower rates in the provinces.

Further particulars and application forms from **CIVIL SERVICE COMMISSION, SCIENTIFIC BRANCH, TRINIDAD HOUSE, OLD BURLINGTON STREET, LONDON, W.1,** quoting No. S94-95/53. Completed application forms should be returned as soon as possible. 20182/260/**HE.**

SITUATIONS VACANT

AUSTRALIA. Two **JUNIOR SALESMEN** required for **VICTORIA** and **NEW SOUTH WALES,** by well-established Company with important Swiss and British representation for dyestuffs, chemicals and auxiliary products. Applicants must have sufficient fundamental knowledge of colouring and processing all textile fibres to require only short intensive training in application of Company's products. Good prospects of advancement in expanding country. State age, qualifications, experience and marital state. Applications in first instance to **BOX No. C.A. 3213, 154, FLEET STREET, LONDON, E.C.4.**

NATIONAL COAL BOARD invite applications for the superannuable appointment of a **CHEMICAL ENGINEER AT THE CENTRAL RESEARCH ESTABLISHMENT, STOKE ORCHARD, NEAR CHELTENHAM, GLOS.,** for research work in the processing of coal and allied materials, involving development of the projects from the laboratory stage onwards and including the design and operation of pilot plant. Applicants should have a good Honours Degree (or equivalent) and previous experience in this type of work is desirable but not essential.

Appointment will be as Scientist, Grade II, salary £645 by £30 to £1,095 per annum, according to qualifications and experience.

Write, giving full particulars (in chronological order) of age, education, qualifications and experience (with dates) to **NATIONAL COAL BOARD, CENTRAL RESEARCH ESTABLISHMENT, STOKE ORCHARD, NEAR CHELTENHAM, GLOS, MARKING ENVELOPE TT/621.** Original testimonials should **NOT** be forwarded. Closing date, May 23rd, 1953.

ORGANIC CHEMIST. Vacancy in recently established Chemical Factory in N. Lincolnshire, for well-qualified Organic Chemist, preferably with good University degree. Candidates should have some years' experience in full charge of substantial production, e.g. of dyestuff intermediates or fine chemicals. The man appointed will be responsible to the Factory Manager initially for part of the production programme. There are good prospects for a man able to accept authority and win the confidence of those working under and over him. Age preferably between 35 and 45. Starting salary not less than £1,200, with excellent contributory pension fund. **APPLY BOX No. C.A. 3214, 154, FLEET STREET, LONDON, E.C.4.**

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SCREENLESS PULVERIZERS for fine grinding of Chemicals. Also CYCLONES, ROTARY VALVE FEEDERS. Callow (Engrs.) Ltd. Kirkby Trading Est.. Liverpool.

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TWO Gunmetal Duplex Fin-blade Jacketed Tilting Enclosed "**MELVIN**" **MIXERS**—29 in. by 27 in. by 24 in. deep. 30 ft. by 9 ft. R. S. **TANK**—12,000 gallons capacity.

New Stainless Steel 50-gal **PANS.** Ditto, 100-gall., with electric agitator.

S.S. Jacketed, Cylindrical Gas Heated Enclosed **MIXER**, 22 in. by 36 in. deep.

Stainless Steel "**GARDNER**" **POWDER MIXER,** 5 ft. by 19 in. by 20 in.

Twin "Z"-blade **MIXERS**—5 in. by 4 in. by 3 in., 6 in. by 11 in. by 11 in., 16 in. by 16 in. by 14 in., 20 in. by 20 in. by 18 in., 29 in. by 27 in. by 27 in. and 36 in. by 30 in. by 26 in. deep.

Four "U"-trough **SIFTER/MIXERS** and various Jacketed **PANS AND MIXERS** up to 1,200 gallons.

PUMPS, HYDROS, STILLS, CONDENSERS, OVENS, AUTUOCLAVES. DRYERS, ETC.

Send for lists.

HARRY H. GARDAM & CO., LTD.
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3 JACKETED INCORPORATORS, double ' Z " arms, double geared, power-driven tipping motion, with counterbalancing weights.

1—Baker Perkins **MIXER** as above, not steam jacketed, single geared, complete with 25 h.p. A.C. motor.

3—Baker Perkins and Werner Jacketed **MIXERS** screw tipping pattern, friction pulley drive, single geared, with double-fin type agitators.

4—Gardner **RAPID SIFTER MIXERS** and **MIXERS** only, various sizes, one with brass fitted interior and glass-lined end plates.

27—Various **POWDER DRESSING** or **SIFTING MACHINES,** totally enclosed with barrels from 80 in. long by 22 in. diam. to 120 in. long by 30 in. diam., belt driven with collecting worm in hopper bottoms.

1—Simon Horizontal Tubular **DRIER,** 12 ft. long, 100 lb. steam pressure, size 3B, requiring 12 b.h.p.

4—Recessed Plate **FILTER PRESSES,** 30 in. square, 70 plates in each, centre fed.

5—Johnson **FILTER PRESSES,** 24 in. square, side feed and enclosed delivery, fitted 29 plates and 30 frames.

1—Johnson **FILTER PRESS,** 36 n. square, plate and frame type, double inlet and enclosed delivery ports.

Johnson Oil **FILTER PRESS,** Premier type plates 2 ft. 8 in. by 2 ft. 8 in., of which there are 45, with angle lever closing gear.

1—Johnson **FILTER PRESS,** 42 C.I. plates, 32 in. square, centre feed.

Steam-heated **FILTER PRESS,** Premier type, 32 in. square, with 30 recessed plates.

Wood **FILTER PRESS,** fitted 69 ribbed plates, 2 ft. 8 in. square, with top centre feed and bottom enclosed delivery channel.

1—24 in. **HYDRO EXTRACTOR,** self balancing, swan-neck type, self emptying bottom.

Heavy Cake **CRUSHING MILL,** 2-pair high, by Nicholson, for cake up to 3 in. thick, rolls 30 in. long, top with coarse teeth 9 in. diam., bottom with finer teeth 12 in. diam.

5 Sets A.A. **CRUSHING ROLLS** for linseed, cotton seed, etc., 48 in. long, belt driven, with feed hopper side frames, baseplate and striking gear.

Bennett Copper-built **EVAPORATOR,** 4 ft. diam. by 4 ft. 6 in. high, steam-jacketed bottom, mounted on legs, with swan-neck vapour pipe and separate vertical belt-driven vacuum pump.

Douglas **ROTARY PUMP** for oil, soap, etc., belt driven.

6 Various Horizontal Duplex **STEAM PUMPS,** Worthington and Tangye pattern, 1 in. to 2½ in. suction and delivery.

"U"-shaped Horizontal **MIXER,** 8 ft. long, 3 ft. wide, 3 ft. 3 in. deep, belt and gear driven, end outlet, square horizontal centre shaft with cast radial type mixing arms, last used for lineoleum paste.

1—" U "-shaped **MIXER,** as above, but 7 ft. long.

4—5-roll **REFINERS,** fitted chilled iron, water-cooled rolls, 40 in. long, 16 in. diam., belt and gear driven, with clutch drive suitable for motor, by Baker Perkins, Ltd.

No. 2HS Hammamac **HAMMER MILL,** No. 1 size, Standard Miracle Mill, No. 2 size Standard Miracle Mill and a No. 3 Super Miracle Mill, with fans, piping and cyclones.

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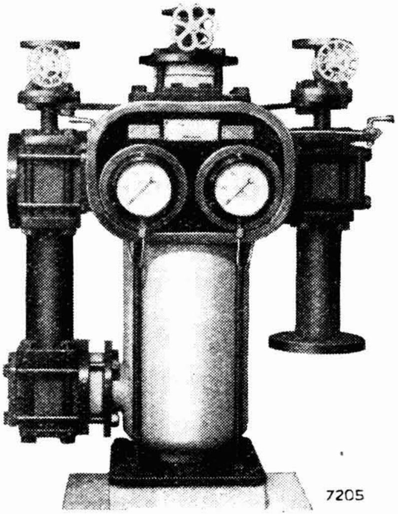

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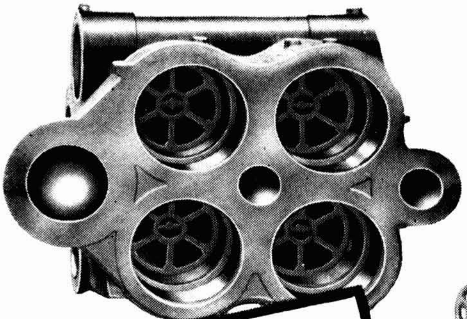

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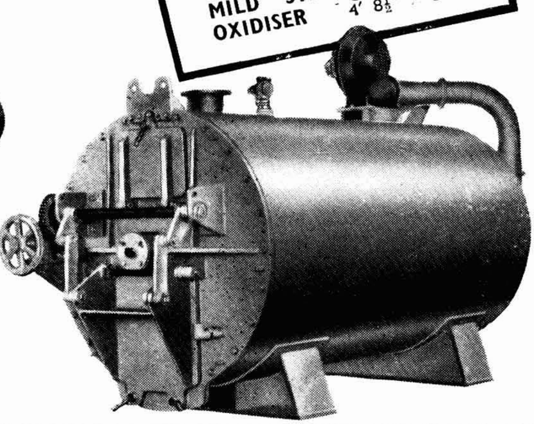

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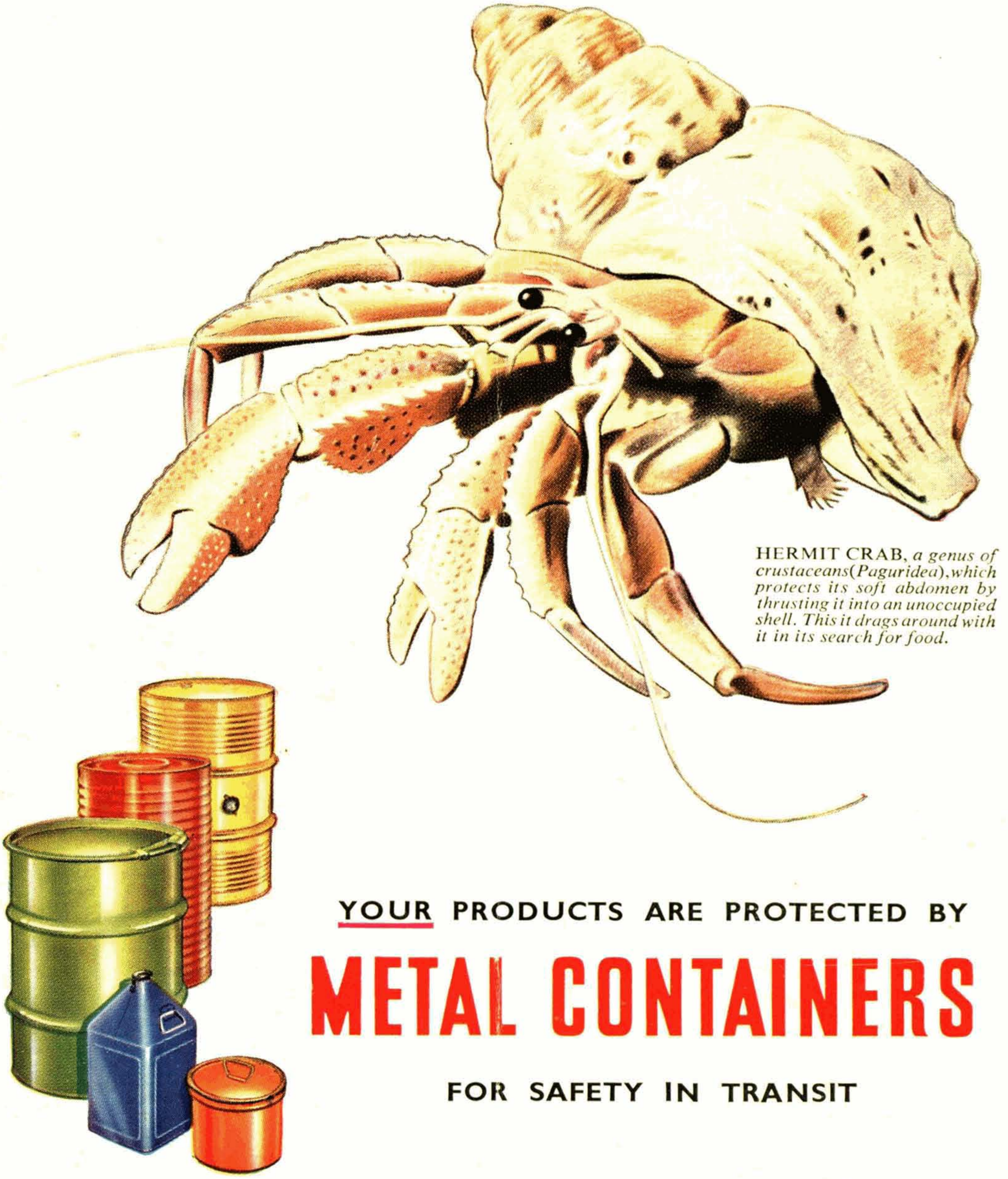

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